Draft

Santa Rosa Subregional Long-Term Wastewater Project

Environmental Impact Report
Environmental Impact Statement

July 1996

Volume I
Chapters 1-3

EIS#________ SCH# 94103069

DRAFT
ENVIRONMENTAL IMPACT REPORT
ENVIRONMENTAL IMPACT STATEMENT

Santa Rosa Subregional Long-Term Wastewater Project

Pursuant to the California Environmental Quality Act
(Division 13, Public Resources Code) and
National Environmental Policy Act (40 CFR 1500-1508 and 33 CFR 325, App. B)

by the
City of Santa Rosa
and
U.S. Army Corps of Engineers, San Francisco District

Cooperating Federal Agencies
Bureau of Land Management, Clear Lake Resource Area
National Oceanic and Atmospheric Administration, Gulf of the Farallones
National Marine Sanctuary

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SUMMARY

The North Coast Regional Water Quality Control Board requires that, by 1999, the Santa Rosa Subregional Wastewater Reclamation System must put in place a reclaimed water disposal solution that meets the Board's reliability requirements, as well as existing and future capacity needs, no matter what weather conditions occur. The purpose of the Santa Rosa Subregional Long-Term Wastewater Project (Project) is to meet this requirement. The City proposes to implement the Project in order to dispose of reclaimed water from the Laguna Wastewater Treatment Plant. Construction of the proposed Project will require a Department of the Army permit from the Corps of Engineers, pursuant to Section 404 of the Clean Water Act (33 U.S.C. 1994) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C 403)

Comments on this Draft EIR/EIS are due by **October 7**, 1996 and should be sent to Marie Meredith at the above address.

DOCUMENT STRUCTURE

You are in Volume I

The Santa Rosa Subregional Long-Term Wastewater Project Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) is presented in seventeen volumes. Volumes I, II, and III contain the main body of the Draft EIR/EIS.

DRAFT EIR/EIS

- I — Summary and Introduction, Mitigation Program, Project Description
- II — Impact Analysis Sections
- III — Impact Analysis Sections Continued

APPENDICES TO THE EIR/EIS

Volumes IV through XVII contain the appendices to the EIR/EIS. The graphic below displays the organization of the volumes and topic areas contained in each.

- IV, V — Project Description
- VI — Agriculture; Geology, Soils and Seismicity
- VII — Hydrology
- VIII, IX — Surface Water Quality
- X — Public Health and Safety; Biological Resources
- XI, XII, XIII — Biological Resources Continued
- XIV — Wetlands, Transportation, Air, Noise
- XV — Cultural Resources, Public Services, Utilities and Recreation Energy; Socio-economics
- XVI, XVII — Final Scoping Report *(Not on CD ROM)*

READING THE EIR/EIS

The document is organized to allow review at three levels of detail, depending on the reader's interest. Chapter 1 (Volume I), Introduction and Summary, provides an overview of impacts. Volumes I, II, and III combined contain the complete EIR/EIS; Volumes IV through XVII contain the technical appendices which support the Draft EIR/EIS. The summary in Volume I is not intended to replace the complete EIR/EIS which provides a thorough evaluation of the environmental impacts.

Volume I includes the Intoduction and Summary, Mitigation Program, and Project Description providing the reader with an overview of the major findings of the Draft EIR/EIS.	**Volumes II and III** include the environmental evaluation of the Project components and alternatives. The volumes also contain a discussion of the environmentally superior alternative, growth-inducing impacts, the significant and unavoidable impacts, and a glossary of terms.	**Volumes IV through XVII** contain the appendices to the EIR/EIS. The Appendices are available for use as supporting documentation for the EIR/EIS providing more extensive data on the settings and analysis.

USING THE TABLE OF CONTENTS

To assist the reader in locating information within the documents, a Table of Contents is in each volume. Tabs are used to assist the reader in locating chapters. Each chapter or appendix contains a more detailed Table of Contents to further direct the reader to the location of information. Due to the amount of information in Chapter 4 (Volumes II and III), Affected Environment and Environmental Consequences, a table of contents is provided for each of the 19 sections in this chapter.

USING THE CD ROM

In the CD ROM version of the Draft EIR/EIS, the underlined references are Hyperlinked text, which, when double clicked, will take the reader to the appropriate section in the appendix document.

HOW TO COMMENT ON THE DRAFT EIR/EIS

A discussion on how to comment on the Draft EIR/EIS is provided in Chapter 1 (Volume 1), Introduction and Summary.

ADDITIONAL ASSISTANCE

An introduction is provided at the beginning of each chapter or section of the Draft EIR/EIS contained in Volumes I, II, and III. The introduction provides information about the contents of the chapter or section.

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VOLUME VI APPENDICES E AND F

LAND USE

No supporting documents produced.

AGRICULTURE

GEOLOGY, SOILS, AND SEISMICITY

VOLUME VII APPENDICES G AND H

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GROUNDWATER

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VOLUME XIV APPENDICES M THROUGH O

JURISDICTIONAL WETLANDS RESOURCES

TRANSPORTATION

AIR QUALITY

NOISE

No supporting documents produced.

VISUAL RESOURCES

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1 INTRODUCTION AND SUMMARY

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1 INTRODUCTION AND SUMMARY

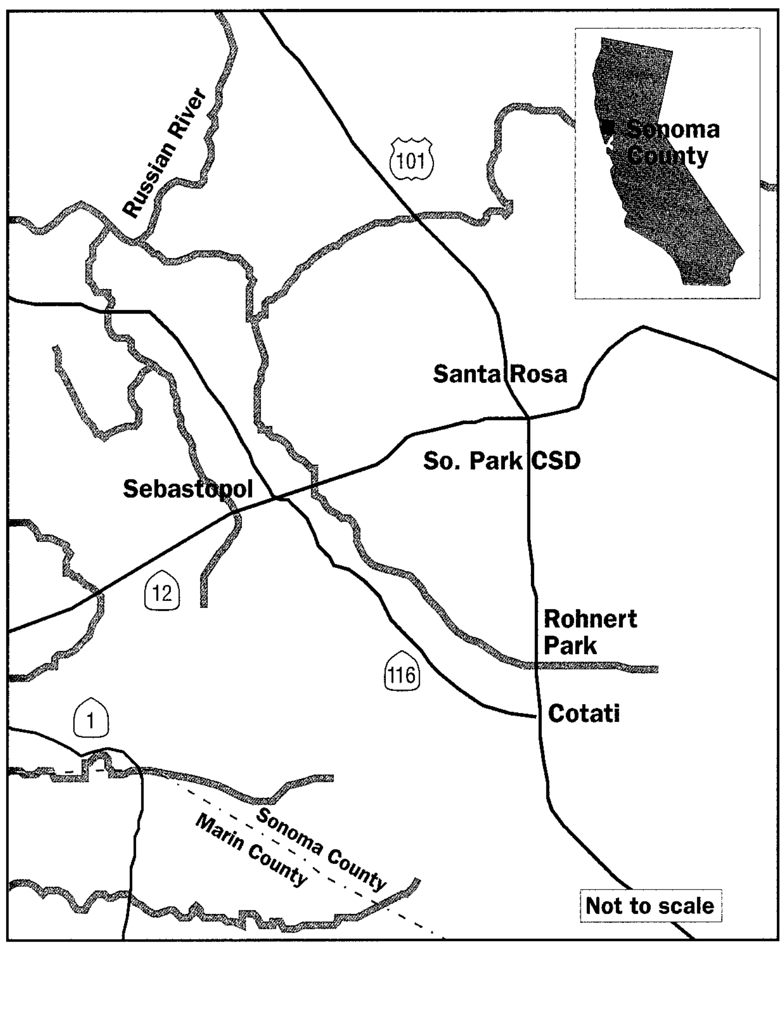
The project proponent, the City of Santa Rosa (managing partner of the Santa Rosa Subregional Wastewater Reclamation System), proposes to implement a Long-Term Wastewater Project. Prior to this action, the City of Santa Rosa must identify and document the potential environmental impacts of the project in accordance with the California Environmental Quality Act and the National Environmental Policy Act. The Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) has been prepared by a team of environmental consultants managed by Harland Bartholomew & Associates (HBA) under the direction of the City of Santa Rosa and the U.S. Army Corps of Engineers (Corps).

This Introduction and Summary serves both as a stand-alone summary and as Chapter 1 of the Draft EIR/EIS for the Santa Rosa Subregional Long-Term Wastewater Project.

Although this Introduction and Summary is made available separately from the main document, in no way does it substitute for the Draft EIR/EIS which addresses each issue in much greater detail.

Copies of the Draft EIR/EIS are available for review or purchase; please see page 1-9 for specific information.

Figure 1-1. *The Subregional Wastewater Reclamation System consists of five member agencies.*



1.1 Purpose and Need

The City of Santa Rosa has adopted the following statement of Purpose and Need for the project.

Need for the Project

The North Coast Regional Water Quality Control Board requires that, by 1999, the Santa Rosa Subregional Wastewater Reclamation System (Subregional System) must put in place a reclaimed water disposal solution that meets the Board's reliability requirements and existing and future capacity needs, no matter what weather conditions occur. The Santa Rosa Subregional Long-Term Wastewater Project (the Project) is intended to meet this requirement.

The volume of water the Project must accommodate is based upon a number of factors including the buildout of the

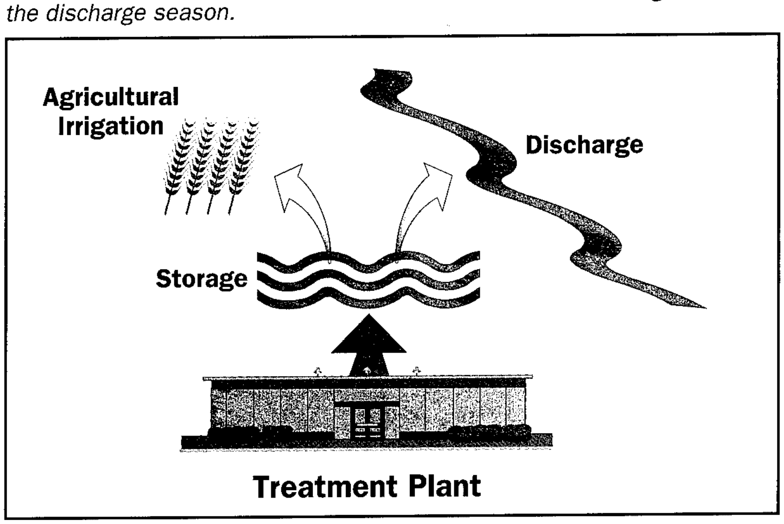
General Plans (current as of April, 1994) of the Subregional members through approximately the year 2010. The Project includes expansion of headworks capacity (capability for pumping sewage from the plant intakes to the treatment facilities) at the Laguna Plant as well as disposal of reclaimed water.

Current Wastewater Management System

The Laguna Plant is part of the Subregional System and provides tertiary treatment of wastewater collected from the cities of Santa Rosa, Rohnert Park, Cotati, and Sebastopol, and from the South Park County Sanitation District (Subregional members) (see Figure 1-1). The Laguna Plant also treats septic waste from most of Sonoma County. The Laguna Plant is currently permitted by the Regional Water Quality Control Board to treat 18 million gallons per day (average dry weather flow).

The Subregional System currently uses a combination of reuse and discharge for disposal of the reclaimed water (see Figure 1-2). A distribution system carries reclaimed water from the Laguna Plant to be used for golf course irrigation, urban landscape irrigation, and agricultural irrigation on about 5,500 acres of land located primarily in the Santa Rosa Plain.

Figure 1-2. *Primary disposal methods for reclaimed water are agricultural irrigation and discharge to the Laguna de Santa Rosa during the discharge season.*



A portion of the reclaimed water is also used for the management of a small created wetland area; a second wetland area is under construction. The Subregional System is supported by storage facilities which hold approximately 1,500 million gallons (MG) of reclaimed water until it can be reused or discharged. During the October 1–May 14 discharge season, reclaimed water from the Laguna Plant that is not used for irrigation is discharged to the Laguna de Santa Rosa and Santa Rosa Creek, which flow into the Russian River approximately 10 miles north of the Laguna Plant.

The Problem

The existing facilities of the Subregional System are not capable of reliably disposing of current reclaimed water flows in accordance with its Regional Water Quality Control Board permit under all weather conditions. Ordinarily, the permitted discharge is limited to a maximum of one percent of Russian River flow. With the permission of the Regional Water Quality Control Board, discharge can temporarily increase to five percent. Storage is provided to hold reclaimed water so that the maximum permitted discharge is normally not exceeded. However, due to a combination of weather conditions which may occur during the discharge season, discharge to the Russian River currently has the potential to exceed the permitted maximum, which, in fact, did occur in 1985 and 1986. These conditions, although

infrequent, occur during winters characterized by periodic light rain, but overall drier-than-normal conditions when river flow remains low. As a result, the Subregional System could be forced to discharge at rates higher than allowable under these conditions, leaving the System without a reliable, legally sanctioned, disposal option.

The Project is intended to provide for reliable disposal of existing reclaimed water flows and the increased volume expected at buildout of the General Plans (in effect at the outset of this analysis in April, 1994) of the communities making up the Subregional System approximately through the year 2010. With implementation of current water conservation programs, reclaimed water flows through the Laguna Plant are projected to increase to about 21 million gallons per day average dry weather flow at buildout.

After reductions due to water conservation, the annual average reclaimed water generation is projected to be about 8,220 MG. This would be an increase of 17 percent over the annual average flow in 1994 of 7,000 MG. The existing reliable capacity for disposal is actually much lower, at about 3,800 MG per year. Therefore, this Project must reliably dispose of 3,200 MG to accommodate 1994 flows and 4,420 MG to meet existing demand plus General Plan buildout flows. The City currently requests an exception to its Russian River discharge permit almost every year, allowing a maximum of five percent River discharge instead of the standard permitted level of one percent.

Project Objectives

The Santa Rosa Board of Public Utilities (BPU), as the governing body of the Subregional System, adopted the following Project objectives on December 16, 1993. The Santa Rosa City Council reviewed these Project objectives on December 28, 1993, and the BPU reaffirmed them on May 27, 1994.

Overall Project objectives:

- Provide wastewater treatment and disposal for the Santa Rosa Subregional Wastewater System to accommodate projected growth as indicated in the currently adopted General Plans of each of the Subregional entities;
- Develop and operate the wastewater treatment and disposal system in ways that protect public health and safety and promote wise use of water resources.

Supporting Project objectives:

The supporting objectives are intended to further define the overall Project objectives and to provide guidance in the development and evaluation of Project alternatives.

- Maximize reclamation, recycling, and reuse of advanced treated wastewater to the greatest extent feasible;
- Reclaimed water that is not reused will be recycled or disposed of in a manner that protects beneficial uses of receiving waters;
- Optimize water resource conservation where practical;
- Operate the wastewater treatment plant and disposal system successfully under all foreseeable weather conditions;
- Satisfy applicable regulatory agency and institutional guidelines and requirements;
- Develop a disposal system that is manageable and reliable;
- Develop a program that can be successfully financed and is economically feasible.

Purpose of the Project

The Project objectives provide guidance for achieving the Project purpose: annual disposal of 8,220 MG of reclaimed water in a reliable, practicable manner that provides the best use of water resources, while protecting public health and the environment. Thus, the City's purpose for the Project is not only to dispose of reclaimed water, but to do so in a manner that maximizes reclamation, recycling, and reuse and optimizes water conservation. Although the need for the Project is driven by reclaimed water disposal requirements, Project elements that provide conservation, reuse, or recycling of water resources are necessary to serve the overall purpose and need of the Project.

The City's purpose in maximizing water reclamation, recycling, and reuse is consistent with the State of California's Water Recycling Act of 1991 (California Water Code, Division 7, Water Quality, Chapters 1–10; California Porter-Cologne Water Quality Act, sections 13576 and 13577). Thus, an important purpose of the Project is to benefit agriculture, greenbelts, and recreation and to protect and enhance fisheries, wildlife habitat, and riparian areas through provision of reclaimed water, an acknowledged valuable resource. The combined purposes of achieving reliable reclaimed water disposal while maximizing water reclamation and recycling and optimizing conservation have determined the Project alternatives under consideration.

1.2 Environmental Regulation

This is the introduction and summary of a Draft Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) on the Project. The Draft EIR/EIS serves as a joint document to meet environmental review requirements of the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). Because this document reflects both federal and state regulations, it is referred to as an EIR/EIS.

National Environmental Policy Act

The EIR/EIS serves as an Environmental Impact Statement (EIS) under NEPA for federal agencies that will need to issue permits. The U.S. Army Corps of Engineers is the federal lead agency under NEPA because most of the alternatives being considered require a Corps permit. As Cooperating Agencies, the National Oceanic and Atmospheric Administration (NOAA) and the Bureau of Land Management (BLM) will also use the document. NOAA is an agency with "special expertise" regarding the Project; it will use the EIS to assess impacts to the Gulf of the Farallones National Marine Sanctuary and make a recommendation to the Corps regarding the City's Section 404 permit application. BLM has "jurisdiction by law" over portions of the Project and will use the EIS to consider environmental impacts which could result due to approval of Geothermal Sundry Permits and granting of Rights-of-Way for geothermal injection wells, pipelines, and roads.

The EIS is prepared in accordance with NEPA and Council on Environmental Quality Regulations 40 CFR 1500 et seq. and Corps NEPA Implementation Procedures for the Regulatory Program (33 CFR 325, Appendix B). The purpose of the EIS is to:

- Assess all reasonable alternatives;
- Provide a full discussion of significant environmental impacts of the alternatives; and
- Inform the decision-makers and public of project alternatives that will avoid or minimize adverse impacts or actually enhance the quality of the environment.

The Draft EIS considers five alternatives at an equal level of analysis. After impacts for the alternatives have been evaluated and disclosed in the Draft EIS, the applicant (City) will select a preferred Project. A Final EIS will then be prepared that will present the City's preferred alternative with the other alternatives. The Final EIS is for use by federal agencies, in conjunction with other relevant information, in their decision whether to approve or deny a permit for the alternative selected by the City.

California Environmental Quality Act

The EIR/EIS also serves as an Environmental Impact Report (EIR) for state and local agencies that will need to issue permits. The City is the CEQA lead agency. The document is prepared in accordance with CEQA and the CEQA Guidelines (California Administrative

Code Section 15000 et seq.). An EIR, as described by the CEQA Guidelines, is a detailed statement prepared to describe and analyze significant effects of a project and discuss ways to avoid or mitigate the effects.

Although the lead agency must consider the information in the EIR, the document's conclusions do not control the lead agency's authority to approve or disapprove a project. A lead agency may approve a project despite its significant adverse impacts if that agency issues two sets of findings. The first set must specifically state how the lead agency has responded to the significant effects identified in the EIR. Secondly, the agency must prepare a "statement of overriding considerations" which sets forth the specific reasons the agency has approved the project despite significant environmental effects. After the City, as lead agency, has certified the EIR and issued the proper findings (if required), the City will select a preferred project.

Other Participating Agencies

Many other agencies have discretionary authority to approve part or all of the Project and will rely on the City and the Corps to produce an EIR/EIS adequate for their needs. In addition, the City and the Corps must confer with other interested public agencies which do not have approval authority over the Project, but which have specific expertise with regard to the Project or have responsibility for resources affected by the Project.

Figure 1-3 shows the relationship among various agencies. Figure 1-4 shows the timeline of the EIR/EIS.

Figure 1-3.

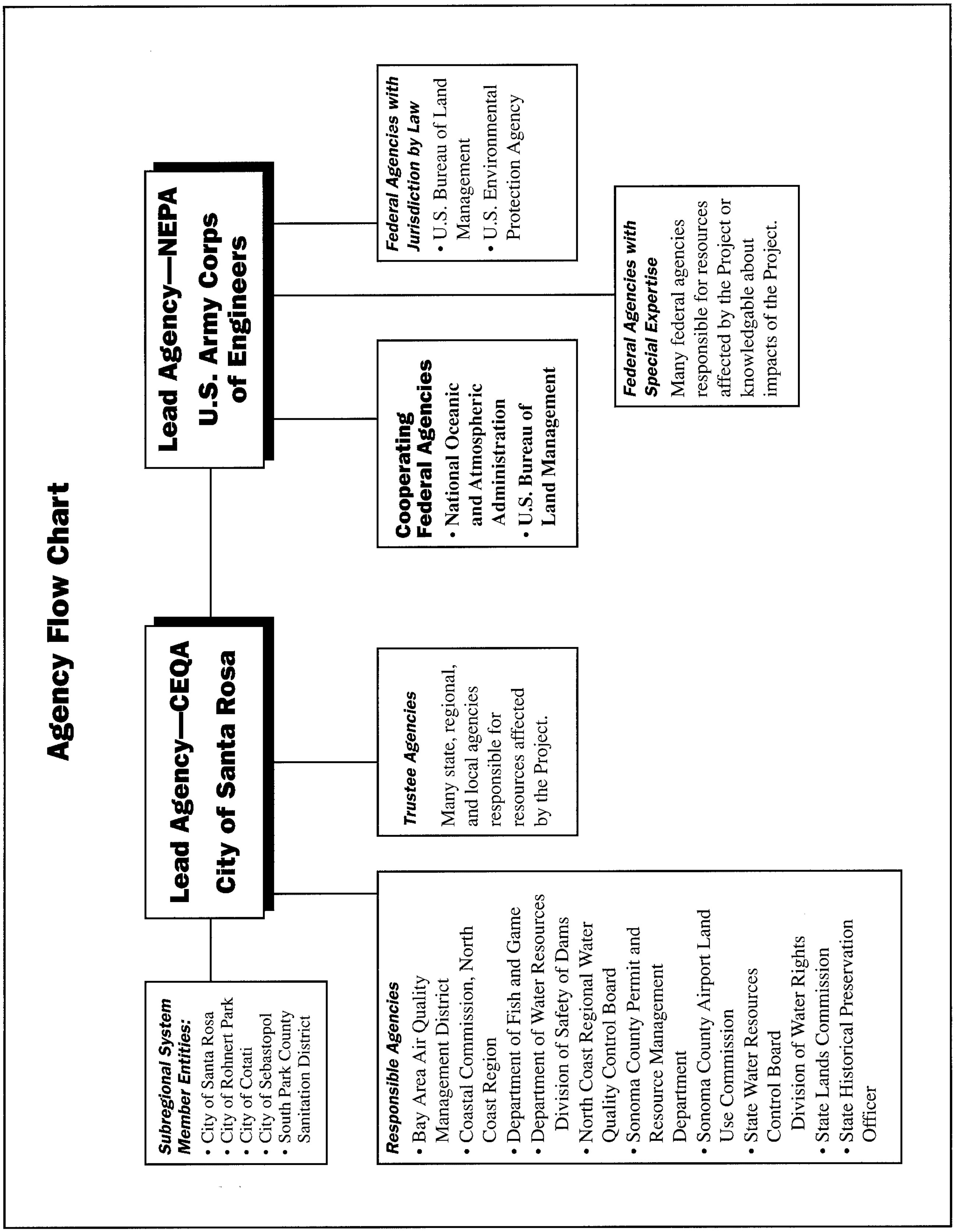
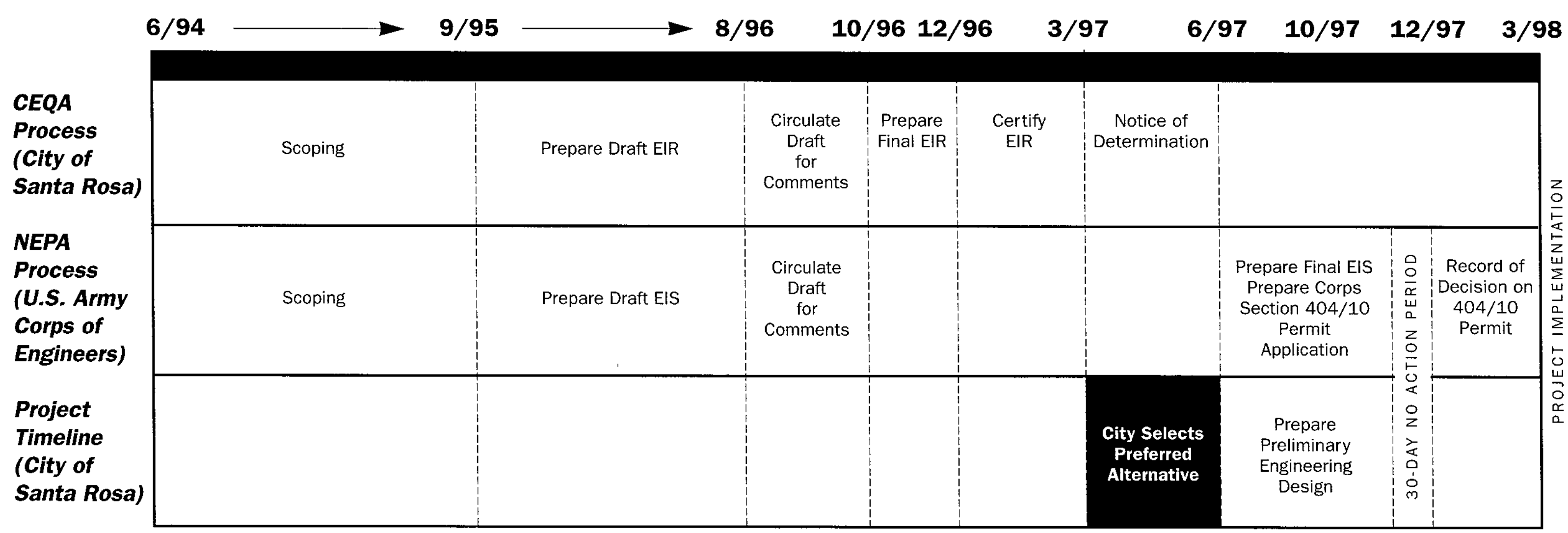

Agency Flow Chart
Lead Agency—CEQA
City of Santa Rosa
Lead Agency—NEPA
U.S. Army Corps of Engineers
Subregional System Member Entities:
• City of Santa Rosa
• City of Rohnert Park
• City of Cotati
• City of Sebastopol
• South Park County Sanitation District
Responsible Agencies
• Bay Area Air Quality Management District
• Coastal Commission, North Coast Region
• Department of Fish and Game
• Department of Water Resources
Division of Safety of Dams
• North Coast Regional Water Quality Control Board
• Sonoma County Permit and Resource Management Department
• Sonoma County Airport Land Use Commission
• State Water Resources Control Board
Division of Water Rights
• State Lands Commission
• State Historical Preservation Officer
Trustee Agencies
Many state, regional, and local agencies responsible for resources affected by the Project.
Cooperating Federal Agencies
• National Oceanic and Atmospheric Administration
• U.S. Bureau of Land Management
Federal Agencies with Jurisdiction by Law
• U.S. Bureau of Land Management
• U.S. Environmental Protection Agency
Federal Agencies with Special Expertise
Many federal agencies responsible for resources affected by the Project or knowledgable about impacts of the Project.

Figure 1-4.

EIR/EIS Timeline



1.3 Availability of the Draft EIR/EIS and the Public Comment Period

The Draft EIR/EIS will be circulated for a minimum of 60 days to allow public agencies and interested individuals to review and comment on the document. A joint public hearing on the Draft EIR/EIS will be held by the Board of Public Utilities, the City Council, and the U.S. Army Corps of Engineers in Santa Rosa on Tuesday, September 24, 1996. Written comments will be accepted by the City until 4:30 p.m. on Monday, October 7, 1996. Public agencies and interested individuals are encouraged to submit comments on the Draft EIR/EIS for consideration and inclusion in the Final EIR. By agreement of the NEPA and CEQA lead agencies, all written comments on the Draft EIR/EIS should be sent to:

Marie Meredith
City of Santa Rosa
Community Development Department
P.O. Box 1678
Santa Rosa, CA 95402-1678
(707) 543-3181

Office hours: 8:30 a.m.–noon,
1:00–4:30 p.m., Monday–Friday.

To facilitate a clear understanding of the comments, please provide a separate sentence or paragraph for each comment and note the page and chapter of the document to which the comment is directed. This approach to commenting on the document will help facilitate the response to comments and preparation of the Final EIR.

Because the Draft EIR/EIS, including the appendices, is so lengthy, it has been published on CD ROM in addition to the normal printed hard copy. The document may be purchased in either printed form or CD ROM (Mac or PC formats) from the Department of Community Development at the previously listed address.

The Draft EIR/EIS, appendices, and reference material are available for review at the Laguna Wastewater Treatment Plant Library. The Draft EIR/EIS and appendices will also be available for review at the libraries listed on the next page. Some libraries have the facilities to view the document on CD ROM. Libraries will have a printed copy of the document. The Central Branch of the Sonoma County Library in Santa Rosa has copies of federal and state legislation and regulatory codes referenced in this Draft EIR/EIS.

Final EIR

At the end of the public review period, written responses will be prepared for written comments received during the circulation period and comments made during the public hearing. The comments and responses will then be included in the Final EIR and will be considered by the City prior to certification of the EIR.

Locations for Reviewing Draft EIR/EIS

Printed copy, CD ROM, and references:

Laguna Wastewater Treatment Plant
4300 Llano Road
Santa Rosa
(707) 543-3350

Printed copy and CD ROM:

Central Branch,
Sonoma County Library
Third and E Streets
Santa Rosa

Civic Center Branch,
Marin County Library
3501 Civic Center Dr.
San Rafael

Rincon Valley Branch,
Sonoma County Library
6959 Montecito Blvd.
Santa Rosa

Ruben Salazar Library
Sonoma State University
1801 East Cotati Avenue
Rohnert Park

Printed copy:

U.S. Army Corps
of Engineers
San Francisco District
Regulatory Branch
333 Market Street
San Francisco

Forestville Library
107 First Street
Forestville

Guerneville Library
4107 Armstrong Woods Rd.
Guerneville

Healdsburg Library
139 Piper
Healdsburg

Monte Rio Library
20466 Highway 116
Monte Rio

Northwest Branch,
Sonoma County Library
150 Coddingtown Center
Santa Rosa

Novato Library
1720 Novato Blvd.
Novato

Occidental Library
73 Main Street
Occidental

Petaluma Library
100 Fairground Drive
Petaluma

Point Reyes Station
Library
Point Reyes Station

Rohnert Park-
Cotati Library
6600 Hunter Drive
Rohnert Park

Sebastopol Library
7140 Bodega Avenue
Sebastopol

1.4 Project Background

The following is a chronology of significant events that have led to the current status of the Subregional System and its need for the Project.

Prior to 1985: In the early 1970's, the City built one of the first water reclamation and reuse systems in the world. Reclaimed water was produced through secondary treatment, and the system started with 1,500 acres of agricultural irrigation. During the 1970's and 1980's Santa Rosa and its Subregional member partners experienced rapid growth. This growth, combined with increasingly stringent regulations on wastewater and unusual weather conditions, made the system vulnerable to failure.

February of 1985: A storm caused a sudden inflow into the collection system, resulting in spilling of about one million gallons of untreated sewage from a manhole near Llano Road prior to reaching the Laguna Plant.

March 1985 and January 1986: Dry weather caused low-flow conditions in the Russian River, preventing release of reclaimed water and causing the holding ponds to fill to capacity. Two planned and coordinated, though illegal, releases of reclaimed water were conducted to reduce strain on the system. The releases exceeded the 1% of river flow allowed in the City's permit. The 1985 release discharged reclaimed water up to 10% of the river flow; the 1986 release, up to 5% of river flow.

Spring 1985: Responding to the 1985 spill and planned discharge, the North Coast Regional Water Quality Control Board fined the City $50,000 and issued a cease-and-desist order. The Board required the City to develop a long-term project that would prevent such releases in the future.

Spring 1986: The Board adopted exception criteria which allowed discharges of up to 5% of river flow during dry winters, but required continued expansion of the irrigation system to compensate for growth.

Fall 1986: The City was challenged in court on the adequacy of the first EIR prepared on an ocean discharge project. Although the lawsuit was settled, the City ultimately decided not to use the EIR or the project it analyzed as a basis for implementing a solution.

December 1988: The Laguna Plant expanded its capacity to 18 million gallons per day and was upgraded to an advanced treatment (tertiary) level.

1990: The Board of Public Utilities (BPU) directed the City staff to proceed with an EIR on a West County Reclamation Alternative, which would expand the existing reuse system into western Sonoma County.

1991: An EIR/EIS was certified and the West County Reclamation project was selected. The City was sued on the adequacy of the document, and it was eventually held to be inadequate.

1992: The California Department of Health Services rescinded its guidelines for the discharge of tertiary-treated reclaimed water into drinking water

sources, thus increasing the number of potential solutions to the reclaimed water disposal problem.

1993: Rather than correct the inadequacies the court found in its previous EIR/EIS, the City initiated a completely new planning and environmental evaluation process. That decision led to the current EIR/EIS and the subsequent decision to analyze a range of options and give equal consideration to each.

Scoping Phase and Environmental Study Phase

The tasks associated with each step were:

Step I-Scoping Phase

- Delineation of the reclaimed water disposal problem;
- Identification of potential alternatives and alternative components;
- Screening and selection of alternatives to be evaluated in the Environmental Impact Report/Environmental Impact Statement (EIR/EIS);
- Determination of analysis to be conducted in the EIR/EIS; and
- Public participation in each of the above tasks.

Step II-Environmental Study Phase

- Design and pre-engineering of the Project alternatives;
- Preparation of related scientific and engineering studies;
- Analyses of the potential environmental impacts based on these studies;
- Public participation in preparation of the environmental analyses; and
- Preparation of the Draft EIR/EIS.

The BPU selected and contracted with Harland Bartholomew & Associates to prepare the EIR/EIS.

The Current Project

A new effort to find a solution to the long-term reclaimed water disposal problem began in early 1993. First, emphasis was placed on the Step I-Scoping Phase to identify and weigh all the solutions considered during previous processes plus any and all solutions suggested through an extensive public involvement program. All these potential solutions or parts of solutions were evaluated and screened resulting in a final set of alternatives to be evaluated in the environmental process (refer to Chapter 3.3 in the Draft EIR/EIS). No preferred alternative was selected; all alternatives were evaluated equally. This extensive Scoping Phase took place over a two-year period. It was then followed by Step II-Environmental Study Phase, during which the environmental analysis of the alternatives was carried out.

An extensive list of potential project alternatives and alternative components, representing a wide spectrum of possible solutions to the Subregional System's reclaimed water disposal problem, was developed by members of the public who participated in workshops at the onset of the Step I-Scoping Phase. The list of potential alternatives and alternative components was carefully reviewed to develop a list for evaluation and screening.

The Santa Rosa Long-Term Wastewater Project Screening Report evaluated 32 alternatives according to criteria adopted

by the BPU and was completed and distributed for review in March, 1994. The BPU selected six alternatives, including the No Action (No Project) Alternative, to be carried forward in the preparation of the EIR/EIS. One alternative, the Community Separator option, was dropped by the BPU in April, 1995. The decision to select these alternatives and drop the Community Separator option from further consideration is discussed in the Draft EIR/EIS, Chapter 3.3, and in the Scoping Report.

After further consideration of the alternatives and comments from interested parties, on April 18, 1995, the Santa Rosa City Council confirmed that four primary alternatives, along with the No Action (No Project) Alternative, were to be considered equally for the purposes of the EIR/EIS.

- *Alternative 1:* No Action (No Project).
- *Alternative 2:* South County Reclamation; agricultural irrigation and associated reclaimed water storage in areas south of Santa Rosa.
- *Alternative 3:* West County Reclamation; agricultural irrigation and associated reclaimed water storage in areas west of Santa Rosa.
- *Alternative 4:* Geysers Recharge; injection of reclaimed water for recharge of the Geysers steamfield located in northeastern Sonoma County.
- *Alternative 5:* Discharge; release of reclaimed water to the Russian River or Laguna de Santa Rosa at a design discharge rate of up to 20 percent of river flow.

(Refer to a more detailed description of alternatives in Section 1.6 of this Introduction and Summary or Section 3.4 of the Draft EIR/EIS.)

Design Discharge

The phrase "design discharge" reflects the maximum monthly discharge rate during normal operations expressed as a percentage of the flow in the Russian River. For example, a five percent "design discharge" scenario indicates that the project was designed with facilities that would accommodate monthly average discharge to the Russian River at five percent or less of river flow in at least 19 out of 20 months. Average discharges would be well below the design discharge, as shown in the following table.

Design Discharge (as a Proportion of River Flow)	**Monthly Average Discharge** October 1–May 14 (as a Proportion of River Flow)
1 Percent	Less than 0.5 Percent
5 Percent	1 Percent
10 Percent	2 Percent
20 Percent	4 Percent

Table 1-1.
Design Discharge

1.5 Public Involvement

Both CEQA and NEPA emphasize the importance of public involvement in the environmental review process. NEPA directs federal agencies to "encourage and facilitate public involvement in decisions which affect the quality of the human environment" to the fullest extent possible (40 CFR 1500.2d). In another section of the regulations dealing with public involvement, NEPA requires federal agencies to "make diligent efforts to involve the public in preparing and implementing their NEPA procedures" (40 CFR 1506.6a and Corps Procedures for Implementing NEPA 33 CFR 325, Appendix B).

CEQA Guidelines, Section 15201, state that, "Public participation is an essential part of the CEQA process. Each public agency should include provisions in its CEQA procedures for wide public involvement, formal and informal, consistent with its existing activities and procedures, in order to receive and evaluate public reactions to environmental issues..." The Guidelines (Section 15083) also encourage the Lead Agency for an EIR "to consult directly with any person or organization it believes will be concerned with the environmental effects of the project."

In order to avoid more serious problems which could arise later in the environmental process, the Guidelines also advise that "many public agencies have found that early consultation solves many potential problems." The Guidelines note that "...this early consultation may be called scoping," and that scoping will be necessary when preparing an EIR.

Planning Public Involvement During Step I-Scoping Phase

Interested members of the public reviewed and commented on the Public Involvement Plan and on the Step I-Scoping Phase starting in mid-1993. The Plan outlined a lengthy process to involve the public in the identification, screening, and eventual selection of project alternatives and alternative components to be analyzed in the EIR/EIS.

Identification of Potential Alternatives and Alternative Components

Three rounds of workshops, held by the City, provided the principal means for public involvement during the Scoping Phase. Summary feedback reports on these meetings were provided to participants and other members of the public several weeks after each round. In the first two rounds of workshops, held in September and November, 1993, participants identified and then defined more specifically, alternatives and components for inclusion in the screening process. Public input received as a result

Project Mailing List

Since early 1993, a mailing list has been maintained incorporating key interest groups and individuals who have expressed an interest in this project. The list also includes policymakers, public agencies, members of the media, and property owners whose property may potentially be impacted. The mailing list has grown to over 2,600 people. *(Refer to Appendix C, Volume III of the Draft EIR/EIS.)*

of interviews with individuals and groups and from written correspondence from interested parties also helped to define the list of 79 candidate alternatives and components. These were in addition to the list of 75 alternatives identified by the BPU prior to March, 1993.

The list of potential alternatives and alternative components was then carefully reviewed by the environmental consultant to develop a list of alternatives for evaluation and screening. The two main objectives in developing this shorter list of alternatives were:

- To include all feasible components suggested by the public during the workshops in the Fall of 1993 in at least one alternative; and
- To develop all reasonable alternatives that would meet CEQA and NEPA requirements for alternatives analysis in the EIR/EIS.

A preliminary list of 20 alternatives was published in December, 1993. This list was distributed to the public for review and comment to ensure that it adequately represented all alternative components nominated for consideration. It was then presented to the BPU in January, 1994. To allow time for further public comment, the BPU continued discussion of the alternatives for an additional week. During this public review period, an additional 10 alternatives were suggested by members of the public and presented to the BPU at the meeting in January, 1994. The BPU directed that all 30 alternatives be evaluated in the Scoping Phase. Two additional alternatives were subsequently developed in response to a request from some members of the public that multiple small reservoirs be evaluated as an option.

Screening and Selection of Alternatives to be Evaluated in the EIR/EIS

The Screening Report was completed and distributed for public review in March, 1994. The report evaluated all 32 alternatives according to criteria which had been reviewed by the public at the Fall 1993 workshops and subsequently adopted by the BPU. Three public workshops were conducted in April and May, 1994 to obtain public comment on which alternatives should be retained for study in the EIR/EIS and how those studies should be conducted. The BPU also received input from the Policy Advisory Committee (comprised of public officials from the Subregional System member communities), Technical Review Group, and the Technical Advisory Committee, who reviewed the Screening Report. In addition, two joint study sessions on the Screening Report were held by the City Council and BPU, during which members of the public and agency representatives commented both orally and in writing regarding which alternatives should be carried forward for study in the EIR/EIS.

Based on the findings of the Screening Report and comments received from the public, advisory bodies and agencies in May, 1994, the BPU selected six alternatives to be retained for study in the EIR/EIS. Subsequently, one alternative was dropped leaving the five alternatives considered in this document.

Public Involvement in Determining the Analysis to be Conducted in the EIR/EIS

In addition to the screening of potential project alternatives, Step I-Scoping Phase provided agencies and members of the public the opportunity to comment on the environmental documentation which would be produced for the EIR/EIS. The formal CEQA/NEPA scoping process began with the release of the Notice of Preparation/Notice of Intent and the Preliminary Scoping Report on October 22, 1994. The Notice of Intent was published in the Federal Register on October 21, 1994. The Preliminary Scoping Report provided a summary of the Project, a description of the alternatives proposed for study, a list of issues and impacts, and a draft scope of work. The formal public scoping meeting was held on November 17, 1994 to receive comments on the Notice of Preparation/Notice of Intent and the Preliminary Scoping Report. Written comments also were received until the close of formal public comment on December 5, 1994. The BPU adopted a revised scope of work in April, 1995 and the Final Scoping Report, with additional revisions, was approved in September, 1995. Volume II of the Final Scoping Report is a Feedback Report that traces how and why public comments received during the formal Scoping Phase were used (or not used) in developing the final scope of work for the EIR/EIS. *(Refer to the Scoping Report in Appendix U-1, Volume XVI of the Draft EIR/EIS. Appendix U is not included on the CD ROM.)*

Public Involvement during Step II—Study Phase: Roundtables

In November and December, 1995, the City sponsored a series of meetings, called Roundtables, to inform participants about how to comment effectively on the Draft EIR/EIS and to view the preliminary results of the consultant's environmental analysis.

The first of two introductory meetings, or Orientation Sessions, provided background information about the EIR/EIS schedule, public involvement, the organization of the EIR/EIS document, and alternatives being studied. The second Orientation Session provided more background on the EIR/EIS process, how to comment effectively on the environmental information, and how the Roundtables would work.

In the Roundtables the environmental consultant presented the approach to analyzing the possible effects of the Project alternatives and shared initial results with participants. The Roundtables provided the opportunity for dialog between environmental consultants and the public about the work in progress. Participants were able to see how the environmental information would be presented in the Draft EIR/EIS. Questions and comments from participants were encouraged by the moderators to help the consultants reexamine their methodologies and preliminary results and, if appropriate, modify their approach and analysis to incorporate the participants' comments.

Roundtables and Orientation Sessions were attended by 160 people. Many attended more than one session. Thirty-nine individuals and organizations submitted written comments on the preliminary EIR/EIS information as well. Attendees' comments were recorded by City staff and Summary Feedback Reports, presenting an informal record of the proceedings, were mailed to all participants about six weeks after the Roundtables concluded.

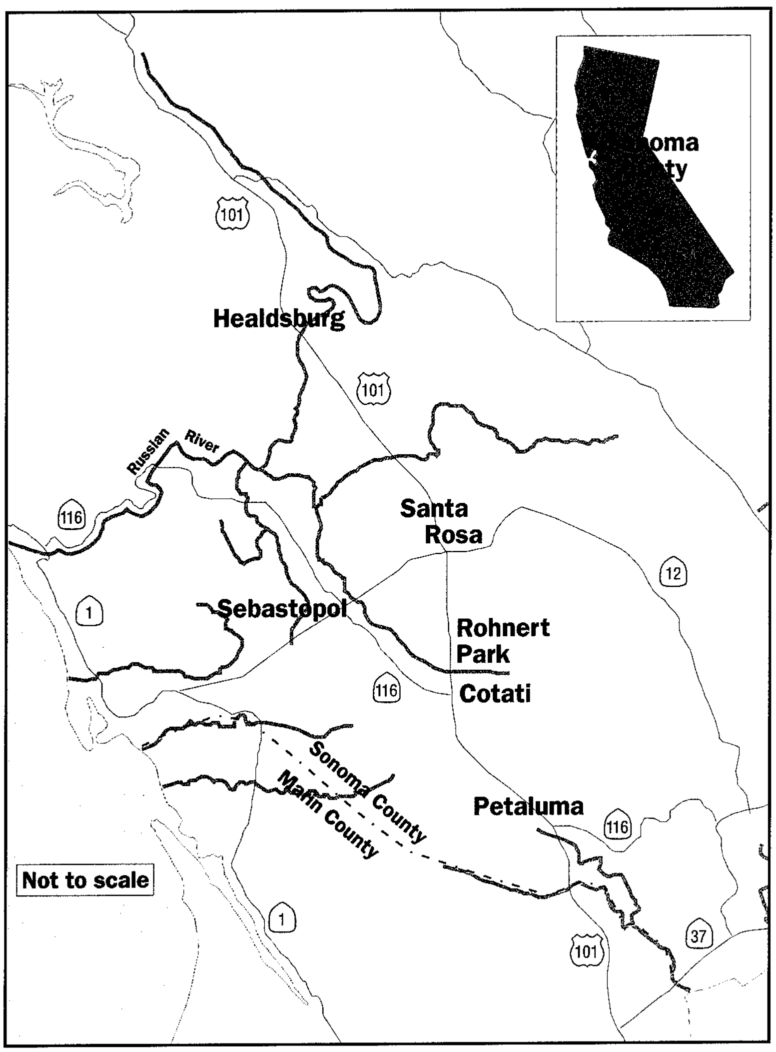
1.6 Description of Existing System and Alternatives

Project Location

(Refer to Chapter 3.1 in the Draft EIR/EIS.)

The Project area is focused on portions of Sonoma County, California, within and adjacent to the cities of Santa Rosa, Rohnert Park, Cotati, Petaluma, and Sebastopol, and extends from the Geysers area north of Healdsburg to the Tolay Creek Valley southeast of Petaluma and the San Antonio Valley in northern Marin County (see Figure 1-5).

Figure 1-5. *The Project extends from northwestern Marin County to northwestern Sonoma County, covering about 45,000 acres.*



Existing System

(Refer to Chapter 3.2 in the Draft EIR/EIS.)

The Laguna Plant has a capacity for 18 million gallons per day (average dry weather flow). The Subregional System disposes of reclaimed water by means of a combination of methods, including urban irrigation, created wetlands in the Santa Rosa Plain, agricultural irrigation, and/or discharge to the Russian River via the Laguna de Santa Rosa

During the period 1993–1996, additional facilities were constructed to improve the reliability of the reclamation system prior to implementation of the Long-Term Project, for example:

- The Laguna Advanced Treatment Upgrade Project;
- The North Pipeline Extension;
- The Rohnert Park Water Reuse Project;
- The Sludge Composting Facility;
- The Laguna Joint Wetlands Project; and
- The West Cotati Reclamation Pipeline Project (under design).

These interim improvements are not part of the Project; they have each undergone separate environmental review, and most of them have been constructed as of the date of publishing this Draft EIR/EIS.

Description of Alternatives

(Refer to Chapter 3.4 in the Draft EIR/EIS.)

Alternative 1—No Action (No Project) Alternative

The No Action Alternative evaluates impacts which would occur if no project were implemented. The No Action Alternative consists of the existing Subregional System, plus various upgrades at the treatment plant and improvements to be constructed under the Interim Period Reclamation System Master Plan. *(Refer to Chapter 3.2 in the Draft EIR/EIS for further discussion of interim improvements.)*

Treatment capacity will remain at 18 million gallons per day (average dry weather flow), limited by capacity of the influent pumps. This Alternative assumes continuation of existing water conservation practices by member entities.

Alternative 1 is based on the assumption that projected growth as indicated in the currently adopted General Plans of each of the Subregional entities will continue through December, 1997. At that time, it is expected that the North Coast Regional Water Quality Control Board will no longer allow new sewer hookups, effectively creating a building moratorium throughout the Subregional System. This Alternative does not meet the Regional Board reliability requirement.

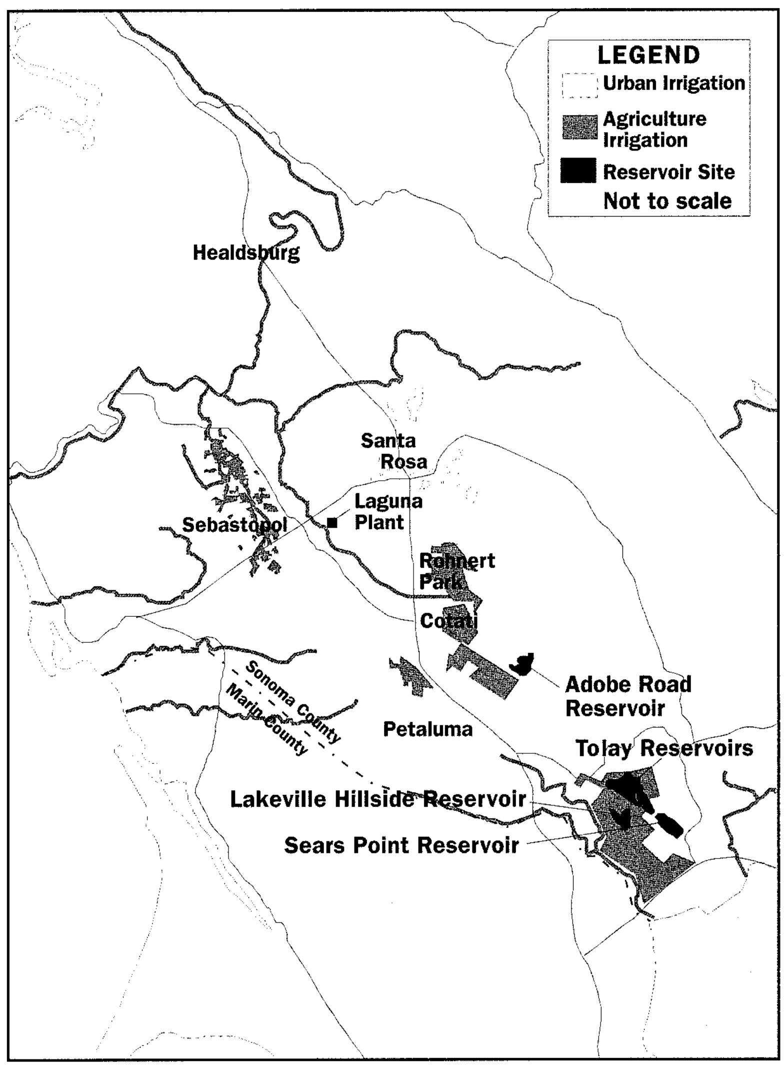
Alternative 2—South County Reclamation Alternative

The South County Reclamation Alternative uses reclaimed water for agricultural irrigation in areas south and east of Santa Rosa (see Figure 1-6). The monthly average discharge rate will be less than one-half percent and the design discharge rate will be one percent of river flow.

Within Alternative 2, four subalternatives have been defined. These alternatives differ in the location of the storage facilities for reclaimed water. The alternatives are:

- Alternative 2A—Reservoir Site: Tolay Extended
- Alternative 2B—Reservoir Site: Adobe Road and Lakeville Hillside

Figure 1-6. *Alternative 2, South County Reclamation with four subalternatives*



- Alternative 2C—Reservoir Site: Tolay Confined

- Alternative 2D—Reservoir Site: Sears Point and Lakeville Hillside

Alternative 3—West County Reclamation Alternative

The West County Reclamation Alternative uses reclaimed water for agricultural irrigation in areas south and west of the Laguna de Santa Rosa (see Figure 1-7). The monthly average discharge rate will be less than one-half percent and the design discharge rate will be one percent of river flow.

Within Alternative 3, five subalternatives have been defined. Again, these alternatives differ in the location of the storage facilities for reclaimed water. The alternatives are:

- Alternative 3A—Reservoir Site: Two Rock

- Alternative 3B—Reservoir Site: Bloomfield

- Alternative 3C—Reservoir Site: Carroll Road

- Alternative 3D—Reservoir Site: Valley Ford

- Alternative 3E—Reservoir Site: Huntley

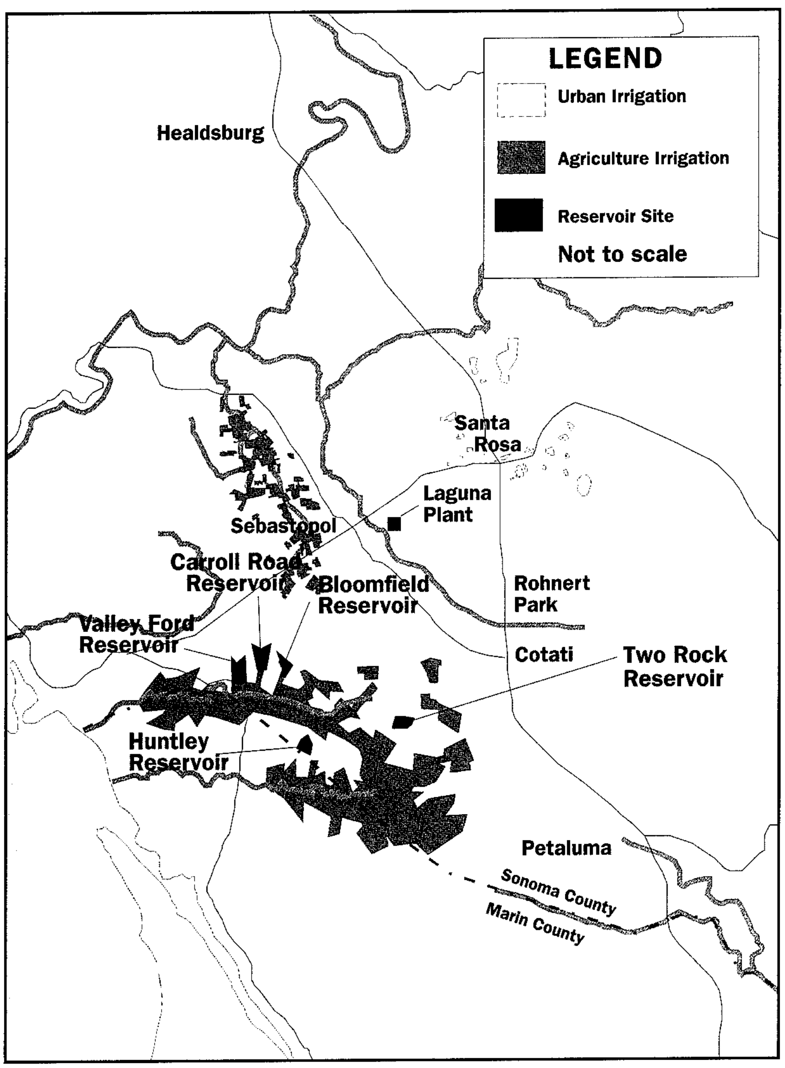
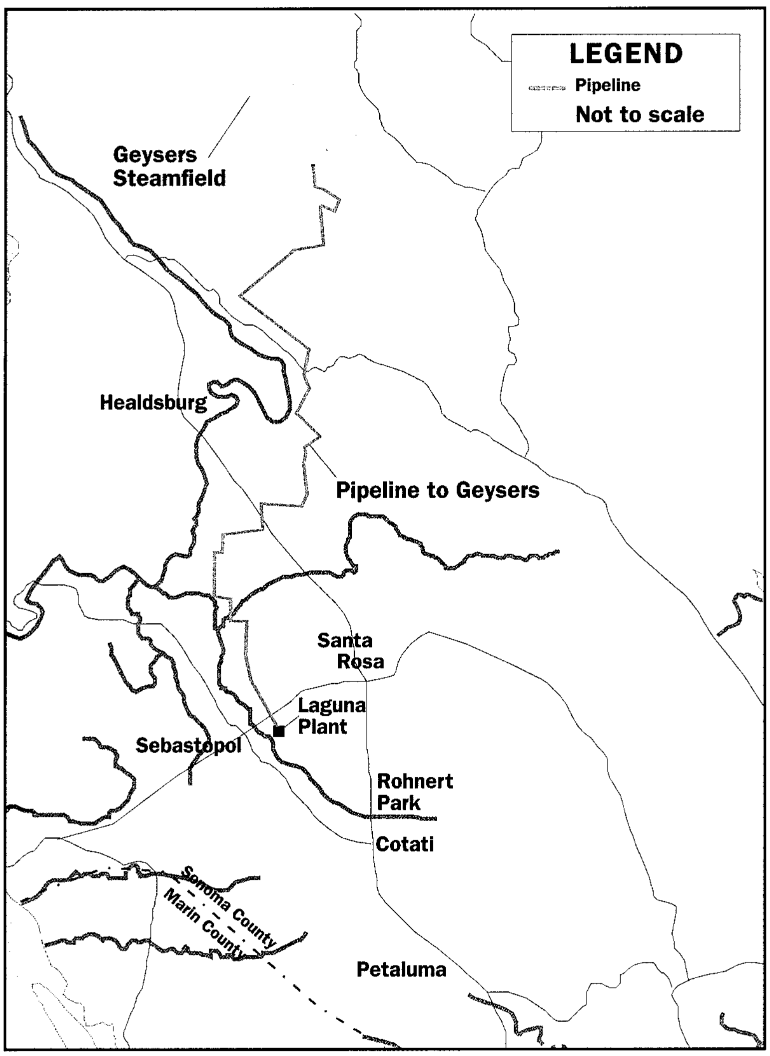


Figure 1-7. Alternative 3, West County Reclamation, with five subalternatives

Alternative 4—Geysers Recharge Alternative

The Geysers Recharge Alternative provides for transmission of reclaimed water to the Geysers, located in the Mayacamas Mountains northeast of Healdsburg, for injection and recharge of the Geysers steamfield, which is currently used as a source for geothermal energy (see Figure 1-8). This alternative will involve discharge to the Russian River only during peak wet weather events (much less than one percent on average), and no additional storage is proposed. It is assumed that existing agricultural irrigation acreage will be reduced by about 2,000 acres through attrition.

Figure 1-8. *Alternative 4, Geysers Recharge*



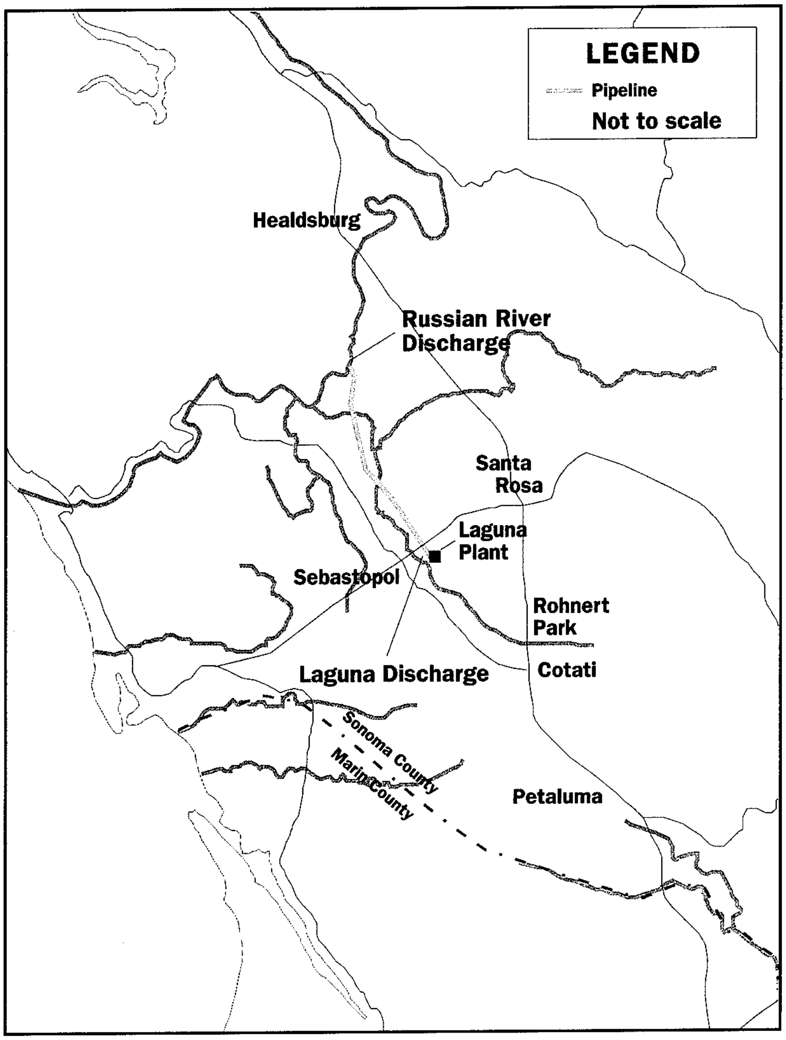


Figure 1-9. *Alternative 5, Discharge, with two sub-alternatives*

Alternative 5—Discharge Alternative

The Discharge Alternative provides for the release of reclaimed water at a monthly average discharge rate of four percent and a design discharge rate of up to 20 percent of river flow (see Figure 1-9). Under Alternative 5 no additional reuse or storage of reclaimed water will be required.

Within Alternative 5, two subalternatives have been defined. These alternatives differ in the location of discharge of reclaimed water. The alternatives are:

- Alternative 5A—Discharge Location: Russian River
- Alternative 5B—Discharge Location: Laguna de Santa Rosa

Discharge directly to the Russian River requires a new outfall structure located upstream of the Sonoma County Water Agency intakes. Discharge to the Laguna would occur at the existing outfall locations.

Improvements Common to Several Alternatives

Alternatives 2, 3, 4, and 5 include expansion of the headworks pumps at the Laguna Plant. Alternatives 2 and 3 include urban irrigation projects in the Fountaingrove and Bennett Valley areas of Santa Rosa. Continuation of tertiary treatment is included in all alternatives.

Description of Components

(Refer to Chapter 3.5 in the Draft EIR/EIS.)

The alternatives evaluated in this EIR/EIS are comprised of various combinations of components such as pipelines and storage reservoirs. All elements of the Project alternatives are included in one of the components described below.

Headworks Expansion

The headworks pumps move sewage from the plant intake to the treatment facilities. The capacity of these pumps currently determines the treatment capacity of the Laguna Plant.

Expansion will be accomplished by replacing existing pumps with new pumps, providing a maximum capacity of 80 million gallons per day for peak wet weather flows, with one pump held in reserve should another need repair.

Urban Irrigation

Two urban irrigation systems will deliver reclaimed water to replace groundwater and/or potable City water now used:

- The Fountaingrove Urban Irrigation System is an extension of the existing reclaimed water irrigation system into the north Santa Rosa area, providing year-round irrigation of approximately 230 acres, including schools, parks, the Fountaingrove Golf Course, and other properties; and
- The Bennett Valley/East Santa Rosa Urban Irrigation System is an extension of the existing reclaimed water irrigation system into the east Santa Rosa area, providing year-round irrigation of 350 acres, including parks, schools, and the Bennett Valley Golf Course.

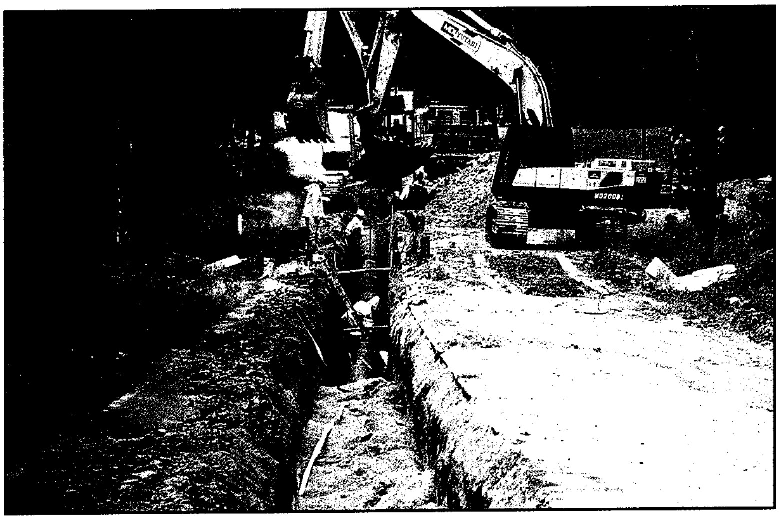
The urban irrigation component will dispose of 380 million gallons of reclaimed water annually, or about 4.5 percent of total disposal needs.

Pipelines

Pipelines will transport reclaimed water from the Laguna Plant to storage reservoirs and distribute stored water from reservoirs to agricultural irrigation areas in Alternatives 2 and 3. Transmission pipelines (i.e., from Laguna Plant to reservoir) are typically 48 inches in diameter and may function as distribution pipelines (i.e., from reservoir to agricultural irrigation areas) during irrigation season. Distribution pipelines range from 6 to 24 inches in diameter. Pipelines are proposed for the Fountaingrove and Bennett Valley Urban Irrigation Systems, conveying reclaimed water from the West College Ponds to various urban irrigation sites.

Pipelines are required in Alternative 4 (Geysers Recharge) to transport reclaimed

Urban Irrigation. *Year-round irrigation of 610 acres will dispose of about 380 million gallons of reclaimed water annually.*



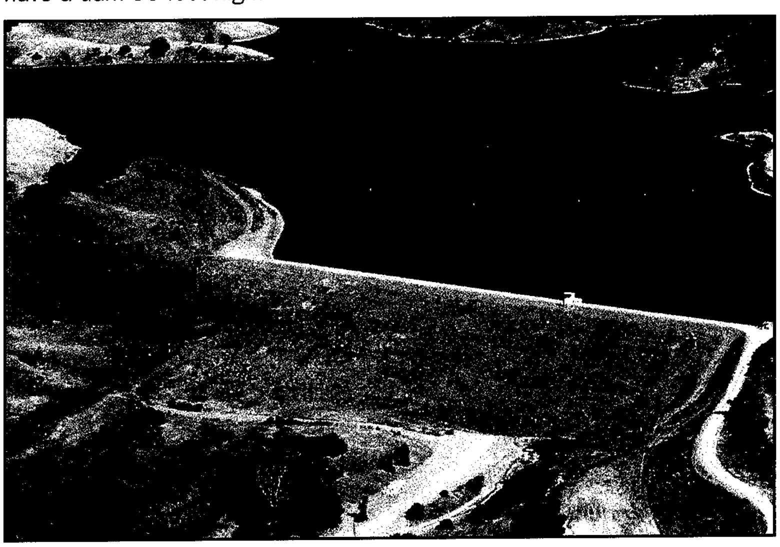
Pipelines.
Up to 90 miles of pipeline will need to be installed if a remote storage reservoir is selected.

water from Delta Pond to the Geysers area, a lift of 3,300 feet. Pipelines would range from 42 to 48 inches in diameter.

Alternative 5A (Russian River Discharge) requires a new 48-inch pipeline from Delta Pond to the Russian River. Alternative 5B (Laguna Discharge) does not require new pipelines.

Pipelines will be buried and will generally follow public rights-of-way. To reach reservoir sites, some pipelines will follow private roads or cross-country alignments.

Storage Reservoirs.
The largest reservoir, Tolay Extended, would hold 5.6 billion gallons, cover 800 acres, and have a dam 90 feet high.



Storage Reservoirs

Ten potential storage reservoirs are included in the Project alternatives; five each in South County and West County. Seven of the reservoir sites satisfy the maximum storage requirements for the Project. Two of the following reservoirs would be necessary to meet storage requirements: Sears Point, Adobe Road, and Lakeville Hillside.

Reservoirs will be constructed by damming a natural drainage or valley with an earth-filled embankment dam. The dam would have a clay core and rock facing for slope protection. For all main dams, a concrete-lined, chute-type spillway will extend from the embankment downslope to an energy dissipation structure in a channel below. The energy dissipation structure will consist of a rock lining for the natural creek channel, downstream from the spillway.

Some reservoirs require back dams and saddle dams to prevent reclaimed water from inundating specific areas. Some reservoirs require concrete lined diversion structures to route storm runoff around them.

Pump Stations

To deliver reclaimed water to West County and South County storage reservoir sites, a new pump station will be located adjacent to the existing station at the Meadowlane ponds across from the Laguna Plant. To deliver reclaimed water to the Sebastopol agricultural irrigation area, a new pump station will be required at Delta Pond. Urban irrigation systems will require new source pump stations at the West College ponds.

To distribute stored water from reservoirs to agricultural irrigation areas, one pump station will be required near the foot of each reservoir dam. In addition to these pump stations, reservoirs at Tolay Extended, Tolay Confined, and Adobe Road also require stormwater pump stations to divert runoff around and downstream of the reservoir.

For Alternative 4, the Geysers Recharge Alternative, a series of four high-pressure pump stations will be required to transport the water about 35 miles from Delta Pond to the Geysers area northeast of Healdsburg.

No additional pumping capacity will be required for either Discharge Alternative.

Agricultural Irrigation

The South County and West County alternatives provide an increase in acreage of agricultural irrigation.

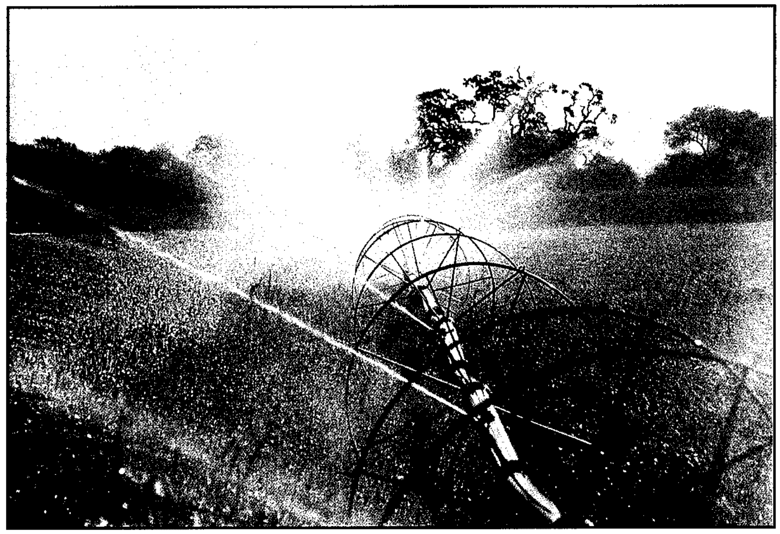
For the South County, an additional 3,800 acres of agricultural irrigation will be required. For the West County, an additional 6,200 acres of agricultural irrigation is required. If agricultural irrigation in the Sebastopol area is utilized (2,200 acres) the agricultural irrigation requirements will be reduced to 2,600 acres for the South County and 4,300 acres for the West County.

Reclaimed water delivered to these areas will be distributed by additional local pipelines to irrigation systems operated by individual users.

Geysers Steamfield

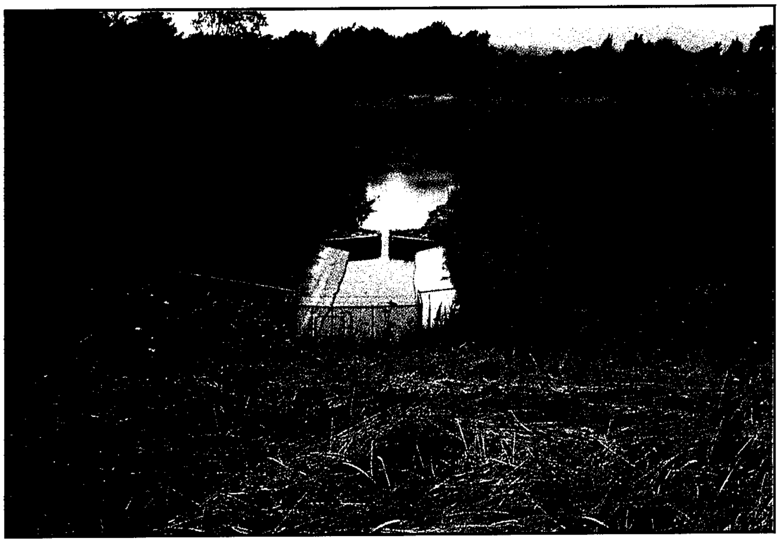
This component will supply reclaimed water to the Geysers for injection into the geothermal steamfield. The intent is to reduce decline in steam production, prolonging the life and economic production of the steamfield and geothermal power plants it supplies.

This component includes two 1,000,000 gallon storage tanks at the end of the transmission pipeline, distribution pipelines to convey water from the storage tanks to the Geysers injection wells, and conversion of 10 to 15 existing geothermal wells to injection wells.



Agricultural Irrigation. *The acreage required for each alternative takes into account the water consumption rate for the climate and soils of the area.*

Geysers Steamfield. *Existing geothermal production wells will be converted for use as reclaimed water injection wells.*



Discharge.
The existing discharge outfalls, one of which is pictured here, would be used for Alternatives 1, 2, 3, 4, and 5B.

Discharge

Two discharge options are considered: new discharge at the Russian River and continued discharge into the Laguna de Santa Rosa from the existing storage ponds. A new outfall structure will be located on the east bank of the Russian River for the Russian River Discharge Alternative. No new construction will be required for Laguna discharge.

Cost Estimates

(Refer to Chapter 3.6 in the Draft EIR/EIS.)

An estimate of major capital, operation, and maintenance costs for project alternatives (in 1995 dollars) was prepared at a planning level of detail, to allow a relative cost comparison among alternatives (see Table 1-2).

Cumulative Projects

(Refer to Chapter 3.7 in the Draft EIR/EIS.)

Cumulative impacts were evaluated based on a cumulative project list. Cumulative projects are defined as those

Table 1-2.

Cost Estimates

	Alternative	Capital Cost[1] (1,000s)	Additional Annual Operation & Maintenance Cost (1,000s)
1	No Action (No Project)	0	0
2A	Tolay Extended	$312,300	$2,500
2B	Adobe Road and Lakeville Hillside	352,200	2,400
2C	Tolay Confined	353,300	2,600
2D	Sears Point and Lakeville Hillside	376,700	3,200
3A	Two Rock	246,400	1,600
3B	Bloomfield	282,700	1,700
3C	Carroll Road	243,500	1,800
3D	Valley Ford	251,500	1,800
3E	Huntley	253,900	1,700
4	Geyser, Recharge	208,300	6,700
5A	Discharge to Russian River	64,000	100
5B	Discharge to Laguna	46,400	0

[1]Capital costs include construction, engineering, and land costs.

past, present or reasonably foreseeable future projects with environmental impacts related to Project impacts. The cumulative Project study area is defined as the watersheds of water bodies potentially affected by one or more Project components: namely the Russian River, Petaluma River, Americano Creek, Stemple Creek, and Tolay Creek.

One potentially cumulative project is the City of Santa Rosa's 1996 update of its General Plan. Refer to Section 3.5 in Description of Existing System and Alternatives, for a discussion of this project.

Required Permits and Approvals

(Refer to Chapter 3.8 in the Draft EIR/EIS.)

There are numerous potentially applicable federal, state, regional, county, and city permits required for the construction, maintenance, and operation of the Project. The Permitting Report (HBA November 1995) identifies permits and approvals to be obtained and timing of permit acquisition. *(Refer to Appendix D-5, Volume IV.)*

1.7 Areas of Controversy and Index of Key Issues to Be Resolved

(Refer to the Scoping Report, Appendix U of the Draft EIR/EIS. This Appendix is not contained on the CD ROM.)

During the Scoping Phase described herein, environmental issues were identified for discussion in this EIR/EIS. The issues are listed below with the chapter or section reference.

Table 1-3.

Issues	Chapter/Section
Agricultural production value	4.18. Socio-economics
Air emissions	4.12. Air Quality
Archaeological resources	4.15. Cultural Resources and Paleontology
Area of Special Biological Significance	4.6. Surface Water Quality
Biological resources	4.8 Terrestrial Biological Resources, 4.9 Aquatic Biological Resources, and 4.10 Jurisdictional Wetlands Resources
Community Separators	4.1. Land Use and 4.14. Visual Resources
Earthquake-induced groundshaking and liquefaction	4.3. Geology, Soils, and Seismicity
Energy requirements	4.17. Energy
Erosion, regarding loss of soil productivity	4.2. Agriculture
Erosion, due to construction	4.3. Geology, Soils, and Seismicity,
Erosion, regarding streambank erosion due to discharge	4.4. Surface Water Hydrology
Fish and wildlife	4.8 Terrestrial Biological Resources and 4.9 Aquatic Biological Resources
Flooding due to dam failure	4.19. Inundation due to Dam Failure and 4.7. Public Health and Safety
Flooding due to discharge	4.4. Surface Water Hydrology
General Plan consistency	Each section
Groundwater	4.5 Groundwater
Growth inducing impacts	Chapter 5
Gulf of the Farallones National Marine Sanctuary	4.6. Surface Water Quality and 4.9. Aquatic Biological Resources
Hazardous waste sites	4.7. Public Health and Safety
Historical resources	4.15. Cultural Resources and Paleontology

(Continues)

(Continued)

Issues	Chapter/Section
Incompatible land uses	4.1. Land Use
Induced seismicity at the Geysers	4.3. Geology, Soils, and Seismicity
Land acquisition	Each section and Appendix D-7
Light and glare	4.14. Visual Resources
Loss of agricultural lands	4.2. Agriculture
Mineral resource designations	4.1. Land Use
National Register properties	4.15. Cultural Resources and Paleontology
Noise	4.13 Noise
Odors	4.12. Air Quality
Open space land converted to urban uses	4.1. Land Use
Paleontologic resources	4.15. Cultural Resources and Paleontology
Parks and recreation	4.16. Public Services, Utilities, and Recreation
Police and fire services	4.16. Public Services, Utilities, and Recreation
Public exposure to chemicals and pathogens	4.7. Public Health and Safety
Rare or threatened species and habitat	4.8. Terrestrial Biological Resources and 4.9. Aquatic Biological Resources
Sediment quality	4.6. Surface Water Quality
Service charges and demand fees	4.18. Socio-economics
Streambank erosion	4.4. Surface Water Hydrology
Tourism	4.18. Socio-economics
Trace elements and salinity buildup	4.2. Agriculture
Traffic, congestion, and restricted access	4.11. Transportation
Unstable slopes	4.3. Geology, Soils and Seismicity
Water Quality	4.6 Surface Water Quality
Wetlands	4.10 Jurisdictional Wetlands Resources
Williamson Act	4.2. Agriculture
Zoning	4.1. Land Use

1.8 Mitigation and Monitoring Program

(Refer to Chapter 2 in the Draft EIR/EIS.)

Project mitigation measures are divided into several types:

- Section 2.1, Compliance with Existing Programs, lists regulations and agency requirements which avoid or minimize environmental impacts. For example, the State Division of Safety of Dams is listed because that agency regulates how dams at the reservoir sites must be designed and constructed to prevent failure. *(Refer to Section 2.1 in the Draft EIR/EIS.)*

- Section 2.2, Measures Included in the Project, lists 27 measures which have been adopted as part of the Project by the City. These measures require both avoidance and minimization of impacts. For example, Measure 2.2.5, Avoid Sensitive Biological Resources, requires that the City install pipelines under streambeds using a jack and bore construction technique at 35 stream crossings. *(Refer to Section 2.2 in the Draft EIR/EIS.)*

- Sections 2.3, 2.4, and 2.5, Planning, Construction, and Operation and Maintenance Measures, list mitigation measures which serve to avoid, reduce, rectify, and compensate for identified impacts. These measures must be approved by the City at the time of Project approval as its commitment to implementation. *(Refer to Sections 2.3, 2.4, and 2.5 in the Draft EIR/EIS.)*

In addition to the specific measures listed in Chapter 2 of the Draft EIR/EIS, the design of the Project alternatives involves many features which serve to avoid or minimize impacts. These features continued to evolve as the environmental evaluation of the Project alternatives progressed.

Regarding Mitigation

CEQA Section 21001: "The Legislature finds and declares that it is the policy of the state that public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effect of such projects..."

Both NEPA and CEQA define mitigation as follows:

(a) Avoiding the impact altogether by not taking a certain action or parts of an action.
(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
(c) Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.
(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
(e) Compensating for the impact by replacing or providing substitute resources or environments.

A Mitigation Monitoring Program is required under CEQA Section 21081.6 to ensure compliance with adopted mitigation measures during project implementation. Similarly, NEPA Section 1505.2(c) requires that the Record of Decision compel compliance with the mitigation measures contained in it through a monitoring and enforcement program.

1.9 Environmental Impacts and Mitigation

(Refer to Chapter 4 in the Draft EIR/EIS.)

A brief summary of the potential environmental impacts and mitigation measures is provided below for each section in Chapter 4 of the Draft EIR/EIS. Following this summary, Table 1.13 provides a list of evaluation criteria, significant impacts, and mitigation measures.

Land Use

(Refer to Chapter 4.1 of the Draft EIR/EIS.)

Potential land use impacts may occur if the Project would change land use in a manner inconsistent with applicable public policies or cause a loss of open space.

Two significant land use impacts have been identified. Alternatives 2B and 3A, Adobe Road and Two Rock reservoir sites, conflict with the Sonoma County Aggregate Resource Management Plan, because the storage reservoirs will prevent use of an existing or potential quarry. The impact on aggregate resources at the Two Rock reservoir site cannot be mitigated due to the volume of aggregate material underlying the reservoir. However, most of the resource at Adobe Road can be used in construction of the reservoir.

Alternative 4, Geysers Recharge, will require conversion of public open space for a pump station located along Pine Flat Road on property for which the Sonoma County Agricultural Preservation and Open Space District holds conservation easements. This impact can be mitigated to a level below significance.

Storage reservoirs for agricultural irrigation are not specifically addressed in the Sonoma County General Plan or Zoning Ordinance. Based upon the function of the reservoirs as an integral part of agricultural production and the presence of other agricultural reservoirs in similar zones, it appears that the reservoirs will be consistent with the General Plan and zoning. None of the Project facilities are located in a designated Community Separator. One pump station and portions of West County agricultural irrigation areas are within the Marin or Sonoma County Coastal Zone.

Agriculture

(Refer to Chapter 4.2 of the Draft EIR/EIS.)

Impacts to agriculture were analyzed to determine whether the Project will result in conversion of prime agricultural land to a non-agricultural use, and whether the Project will impair the agricultural productivity of prime agricultural land.

Impacts will occur primarily due to construction of reservoirs, resulting in loss of prime farmland and the cancellation

Table 1-4. *Each reservoir site has either grazing land or farm land or both.*

Loss of Farm & Grazing Land at Reservoir Sites
(acres)

	Farm	Grazing
Tolay Extended	456	158
Adobe Road	28	147
Tolay Confined	108	76
Lakeville Hillside	0	152
Sears Point	0	274
Two Rock	114	115
Bloomfield	0	195
Carroll Road	0	241
Valley Ford	0	230
Huntley	0	184

of Williamson Act contracts (see Table 1-4). At the same time, provision of reclaimed water for irrigation will have a beneficial impact on the amount of prime farmland in the study area, by raising the status of land to a more productive category as measured by the State Farmlands Mapping Program. However, the increase in acres qualifying as Prime Farmland cannot be estimated, because it is unknown which landowners may contract with the City for reclaimed water.

Construction of the Bloomfield and Huntley reservoirs (Alternatives 3B and 3E) will result in the cancellation of Williamson Act contracts for two adjoining properties remaining in private ownership after acquisition of the reservoir site, as the remainder of these parcels would be less than the minimum for such contracts.

Construction of pump stations will result in loss of prime farmland under Alternatives 2, 3, and 4. There is no mitigation available to reduce impacts from loss of prime farmland or cancellation of Williamson Act contracts to less than significant.

Agricultural irrigation will have a significant adverse impact on soil productivity due to erosion of topsoil; however, mitigation is available to reduce this impact to less than significant. The Project will not have a significant effect on soil productivity due to build up of trace elements or salts.

Geology, Soils, and Seismicity

(Refer to Chapter 4.3 of the Draft EIR/EIS.)

The Geology section analyzes issues related to slope stability, earthquakes (including ground rupture, shaking, liquefaction, and induced seismicity at the Geysers), and soil limitations such as corrosiveness and expansiveness. Unstable slope conditions present problems for some South County reservoirs, which will experience accelerated siltation. Unstable slopes will also affect the Geysers pipeline. Although all of the alternatives are potentially subject to strong ground shaking in an earthquake, these impacts can be avoided by constructing facilities according to requirements of the Division of Safety of Dams and building codes, and impacts are, therefore, less than significant. Liquefaction is a concern for the Russian River outfall and four pump stations common to both the South County and West County Reclamation alternatives, and the hazard can be mitigated to a level below significance.

The Geysers and urban irrigation pipelines cross an active fault. As a result, the Discharge Alternative is the only option not subject to the significant impacts associated with ground rupture. Geysers injection will cause a modest increase in induced seismicity, but impacts will be less than significant due to the small magnitude of the seismic events and the small increase in frequency of such events.

Some South County Alternative facilities will be subject to damage from expansive and corrosive soils, but these impacts can be mitigated. Erosion during construction will not be significant for any of the alternatives with implementation of appropriate erosion control plans.

Surface Water Hydrology

(Refer to Chapter 4.4 of the Draft EIR/EIS.)

None of the components associated with the Reclamation, Geysers, or Discharge alternatives will cause significant streambank erosion or significantly affect flooding in the Laguna de Santa Rosa or Russian River. However, the cumulative effect of reclaimed water discharge and increased runoff due to development in the Russian River watershed may cause a significant flooding impact. The Project's contribution to flooding would be mitigated by avoiding discharge during flood conditions.

Groundwater

(Refer to Chapter 4.5 of the Draft EIR/EIS.)

Both South and West County alternatives will degrade groundwater quality of existing and potential drinking water wells, as a result of nitrate levels in reclaimed water migrating from reservoirs. Reservoirs will also deplete groundwater levels in the immediate vicinity of the dam. These impacts can be mitigated by monitoring groundwater movement and levels and providing an alternative water supply if necessary.

Localized groundwater mounding near West County reservoirs will affect leachfields, which can be mitigated with installation of non-conventional septic systems. Geysers Recharge and Russian River Discharge alternatives will not affect quantity or quality of groundwater in drinking water wells.

Surface Water Quality

(Refer to Chapter 4.6 of the Draft EIR/EIS.)

The Surface Water Quality section evaluates the potential of the Project to exceed EPA standards designed to protect aquatic life and Regional Water Quality Control Board standards designed to protect beneficial uses of surface waters. Also, the section specifically addresses water quality changes in special sites, including the esteros and the Gulf of the Farallones National Marine Sanctuary. Finally, the section evaluates Project impacts relative to proposed EPA sediment quality standards.

The No Action Alternative, which includes a slight increase in discharge to the Laguna de Santa Rosa compared with existing conditions, will have both significant adverse and beneficial impacts on biostimulatory substances in the Laguna, depending upon hydrologic conditions; however, adverse effects will be more frequent than beneficial effects. In addition, the City will not be able to meet its Waste Reduction Strategy goal assigned by the Regional Water Quality Control Board. (This Strategy assigns goals for nitrogen and ammonia reduction for dairies along the Laguna and discharge from the Subregional System.) Significant impacts due to increased toxicity and cyanide levels will also occur.

Reservoirs in both the South and West County alternatives will result in seepage which will cause significant water quality impacts for a short segment of stream below each dam.

The one percent design discharge *(refer to page 13 of this Summary for an explanation of design discharge)* to the Laguna associated with the South and West County alternatives will have both significant adverse and beneficial impacts on biostimulatory substances under different hydrologic conditions;

Water Quality Terminology

Water quality criteria (standards) have been developed by the U.S. Environmental Protection Agency and the Regional Water Quality Control Board to protect aquatic life and to protect against aesthetic water quality impacts. Here are some of the types of conditions which have led to establishment of the criteria:

- **Biostimulation.** Growth-inducing substances, such as nitrogen, can stimulate plant production. This growth, known as biostimulation, can consume more oxygen than is available in the water. Because dissolved oxygen is required for aquatic plants and animals, depletion of oxygen that occurs in association with heavy algae blooms is undesirable. No numeric criteria have been established by federal or state authorities for nitrogen compounds to prevent biostimulation; instead a narrative criterion has been established to limit biostimulatory effects and to control algae.
- **Toxicity and Bioaccumulation.** Organic compounds and metals (for example, pesticides, PCBs, petroleum products, and copper) can be toxic to aquatic life. Many metals are required for normal plant or animal growth and are toxic only at higher concentrations. Bioaccumulation occurs when a constituent accumulates in biological tissue to levels that exceed the concentration in surrounding water. Some substances are toxic but do not bioaccumulate (for example, salt and ammonia). Other substances are not toxic at concentrations found normally in water, but are toxic at concentrations that can develop through the food chain (for example, PCBs). Numeric criteria have been established for many toxic effects, but not for bioaccumulation. Instead, potential bioaccumulation impacts are generally evaluated through an ecological risk assessment, which can be found in the Draft EIR/EIS Aquatic Biological Resources Section, 4.9.
- **Physical and Habitat Effects.** Some substances have damaging effects on habitat or directly on organisms. For example, silt can affect fish gills or accumulate in the bottom of a creek, rendering the creek unsuitable for organisms that require sand or gravel for reproduction. No numeric criteria have been established for physical substances, but narrative criteria have been set for turbidity, oil and grease, suspended matter, settleable matter, floating material, and color.
- **Aesthetics.** The narrative criteria listed above for physical and habitat effects also protect against aesthetic impacts.

however, beneficial effects will be more frequent. Also, these alternatives will meet the City's Waste Reduction Strategy goals.

Irrigation in both South and West County alternatives will result in subflow (underground flow) discharge to local creeks. The impact on South County streams is less than significant. The West County Alternative irrigation subflow will discharge to Americano and Stemple creeks. These feed into the Estero Americano and the Estero de San Antonio, which are part of the National Marine Sanctuary, where any change to the water quality is considered significant. Changes in salinity, ammonia concentration, dissolved oxygen, biostimulation, metals, nutrients, individual inorganic minerals, and organic compounds will occur in the esteros.

The 20 percent design discharge alternatives will result in significant impacts to the Russian River, the Laguna, and Santa Rosa Creek. A 20 percent design discharge to either the Laguna or the Russian River will have both significant adverse and beneficial impacts with respect to biostimulatory substances and turbidity depending upon hydrologic conditions; however, adverse impacts will be more frequent.

A 20 percent design discharge to the Russian River will also have significant adverse impacts with respect to conductivity. By moving the existing discharge from the Laguna to the Russian River, a significant contribution will be made toward reaching the City's Waste Reduction Strategy goals in the Laguna. Conversely, a 20 percent design discharge to the Laguna will have

significant adverse impacts on Waste Reduction Strategy goals, as well as adverse impacts on water quality with respect to dissolved oxygen, cyanide, and toxicity levels, but a beneficial impact on turbidity.

Mitigation will reduce some discharge impacts, such as those with respect to cyanide, turbidity, Waste Reduction Strategy, and toxicity, below the level of significance. Other discharge impacts, such as those on conductivity, dissolved oxygen, and biostimulatory substances, will be significant and unavoidable. However, the cumulative projects include reduction of nutrients to the Laguna. With implementation of cumulative projects and mitigation proposed for the Long-Term Project discharge impacts, the 20% design discharge to the Laguna will have a less-than-significant impact. Impacts of storage and irrigation on streams will also be reduced below the level of significance, but impacts of storage and irrigation on the esteros will remain significant.

Public Health and Safety

(Refer to Chapter 4.7 of the Draft EIR/EIS.)

Based on findings of the human health risk assessment (see insert), potential exposure to pathogenic organisms and to all chemicals except nitrate is less than significant for all alternatives.

The only potentially significant impact is exposure to increased nitrate concentration resulting from migration of groundwater from reservoirs to local water wells in West and South County, as noted in the Groundwater Section. This impact will be mitigated by monitoring groundwater movement and providing an alternative water supply as necessary. Due to the headworks expansion at the Laguna Plant, increased chlorine use is expected; this will not present a significant risk because existing safety procedures provide appropriate safeguards. All safety hazards associated with construction can be mitigated. Dams associated with the West and South County alternatives

How Risk Assessment Works

A risk assessment models how chemicals and pathogens move through the environment and what effects they might have on humans, animals, and their food supplies. Risk assessment is a scientifically recognized way to analyze these potential effects without actually subjecting the real world environment to risk. Two separate risk assessments are included in this EIR/EIS. The **Ecological Risk Assessment** analyzes Project impacts on fish and wildlife either through direct contact with chemicals in surface soil, water, and sediments, or through ingestion. The **Human Health Risk Assessment** analyzes health risks to humans in a similar fashion, by assessing the direct effects of exposure to reclaimed water as well as the indirect effects of eating fish caught in water bodies which receive reclaimed water discharges.

Risk assessment models are set up by making assumptions that deliberately overestimate all the components of risk, a much more severe situation than could ever be expected to occur in reality. For example, the Public Health Risk Assessment assumes that humans would use 100% reclaimed water as their domestic water supply for their lifetime. By assuming conditions much worse than could occur in the real world, the risk assessment provides the assurance that a prediction of no impact, means no impact in reality.

The Ecological Risk Assessment is in the Aquatic Biological Resources Section 4.9, and the Public Health Risk Assessment is in the Public Health and Safety Section, 4.7.

Loss of Native Plant Communities at Reservoir Sites
(acres)

	Oak Woodland	Riparian Woodland	Native Grassland
Tolay Extended	0	7	25
Adobe Road	17	60	0
Tolay Confined	0	7	25
Lakeville Hillside	0	11	0.6
Sears Point	0.6	59	0
Two Rock	58	16	1
Bloomfield	0.6	10	0
Carroll Road	0	17	1
Valley Ford	1	9	0
Huntley	0	5	2

Table 1-5. *Sensitive native plant communities have undergone substantial reductions throughout California. Further loss due to the Project must be fully mitigated.*

would be constructed in accordance with requirements of the Division of Safety of Dams, and will therefore be expected to pose an insignificant risk to public safety from dam failure and resultant flooding.

Terrestrial Biological Resources

(Refer to Chapter 4.8 of the Draft EIR/EIS.)

The evaluation indicates that no endangered, rare, or threatened terrestrial species or their habitat will be affected by the Project. Many impacts will be avoided by measures adopted as part of the Project which require relocation of pipeline alignments, pump stations, and other facilities in response to sensitive biological resources. Also, measures included in the Project will require sensitive resources, such as oak woodlands and riparian woodlands in the agricultural irrigation areas, to be avoided.

The primary significant impact of the Project is loss of sensitive plant communities such as oak woodland, native grassland, and riparian woodland, through construction of storage reservoirs (see Table 1-5). These impacts will be mitigated through compensatory measures in the Sensitive Biological Resources Conservation Program and Revegetation Program.

A significant but mitigable impact is the loss of sensitive native plant communities due to the outfall structure required for the Russian River Discharge Alternative.

The combined impact of the Project and cumulative projects results in three new significant impacts: loss of hayfield tarplant and bristly linanthus populations at Two Rock and Huntley; loss of annual grassland for all the reclamation alternatives; and, increased ecological risk to fish-eating birds for alternatives discharging to the Laguna. Mitigation is provided for the plant population and ecological risk, but no feasible mitigation has been identified for the loss of annual grassland.

Aquatic Biological Resources

(Refer to Chapter 4.9 of the Draft EIR/EIS.)

The evaluation indicates that the only endangered, rare, or threatened aquatic species or habitat affected by the Project is the red-legged frog. There are two closely related subspecies of red-legged frog in the Project area. Northern red-legged frogs are a California Department of Fish and Game species of special concern. The California red-legged frog is federally-threatened.

The recent federal ruling establishing the status of California red-legged frog as federally-threatened provided the

geographic range of the species. Red-legged frogs at the South County reservoir sites are identified as the California subspecies and are considered federally-threatened. All other red-legged frogs in the Project area appear to be the northern subspecies, although final confirmation has not been received. Pending confirmation, the Draft EIR/EIS considers all red-legged frogs in the Project area to be the California subspecies.

Many impacts will be avoided by measures adopted as part of the Project which, for example, require jack and bore construction techniques for placement of pipelines across streams.

Habitat for a species of special concern, the northwestern pond turtle, was found at the Tolay reservoir sites. This significant impact will be mitigated by compensatory measures in the Sensitive Biological Resources Conservation Program.

Freshwater marsh, valuable stream habitat, or pond habitat will be lost due to reservoir construction at all the reservoir sites except Bloomfield, Valley Ford, and Huntley.

Dams at storage reservoirs will cut off flows downstream, significantly affecting aquatic habitat at all reservoir sites except Sears Point, Two Rock, and Huntley. These significant impacts will be mitigated through compensatory measures found in the Sensitive Biological Resource Conservation Program.

An ecological risk assessment was performed to evaluate potential impacts due to bioaccumulation or toxicity in aquatic species exposed to reclaimed water from the storage reservoir, agricultural irrigation, or discharge components. This screening level risk assessment identified no significant impacts for any of the components.

Significant impacts were identified for the West County Reclamation Alternative because both reservoirs and agricultural irrigation will cause some alteration of aquatic habitat in the esteros, a part of the Gulf of the Farallones National Marine Sanctuary. Because of the sensitivity of the esteros' ecology and the regulatory environment of the Sanctuary, any effect in this region is considered significant, and no feasible mitigation has been identified.

Jurisdictional Wetlands Resources

(Refer to Chapter 4.10 of the Draft EIR/EIS.)

Substantial acreage of wetlands will be destroyed by construction of the storage reservoirs for both the South County and West County Reclamation Alternatives (see Table 1-6). Less than an acre of wetlands will be filled for the outfall structure associated with the Russian River Discharge Alternative. Each of these impacts is significant and will be mitigated through compensatory measures identified in the Sensitive Biological Resources Conservation Program.

Also, pipeline alignments for the Reclamation and Geysers Recharge alternatives cross several intermittent streams, where construction will take place during the dry season. Though no permanent fill will be placed in the streams, there will be some disturbance

Loss of Wetlands at Reservoir Sites (acres)	
Tolay Extended	248
Adobe Road	30
Tolay Confined	87
Lakeville Hillside	22
Sears Point	53
Two Rock	62
Bloomfield	57
Carroll Road	69
Valley Ford	102
Huntley	48

Table 1-6. *To meet the state and federal policies of no net loss of wetlands, all loss of wetlands will be fully mitigated.*

of stream environment, resulting in significant impact. This impact will be mitigated through limitations on the timing of construction, careful revegetation, and restoration of the streambed.

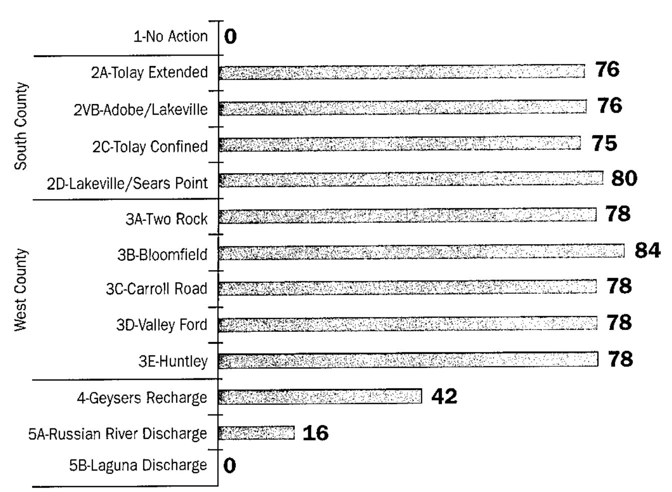
Table 1-7. *If sensitive biological or visual resources or private improvements are located within the public right-of-way, pipeline construction may be moved into one lane of traffic to avoid impacts.*

Transportation

(Refer to Chapter 4.11 of the Draft EIR/EIS.)

The Project will not generate significant traffic in the post-construction phase, and there are no permanent changes planned for the existing transportation network. Therefore, the transportation evaluation focuses on construction-related impacts. Many construction-related impacts have been avoided through Standard Traffic Control Procedures adopted as part of the Project. *(Refer to Measures 19–23 in Chapter 2.2 of the Draft EIR/EIS.)* These Procedures provide for notification and rerouting of emergency vehicles, management of lane closures and access, jack and bore construction for pipelines under high volume roadways and railroads, parking and road repair requirements, limitations on construction and delivery hours, transportation and encroachment permit requirements, and safety procedures.

Roadway Miles Affected by Pipeline Construction



Remaining significant traffic impacts will occur during the construction phase of all alternatives (except the Laguna Discharge Alternative, which involves no construction). Table 1-7 indicates how many miles of pipeline would need to be built within the public right-of-way for each alternative.

Lane closures for pipeline construction will delay traffic, delay transit services, restrict access, increase safety hazards, and reroute traffic, including emergency vehicles. Also, construction traffic will add vehicles and trucks to local roads, causing significant congestion.

Air Quality

(Refer to Chapter 4.12 of the Draft EIR/EIS.)

Construction of reservoirs associated with the West County and South County alternatives will generate emissions

exceeding the point of significance for particulates (dust), nitrogen oxides, and carbon monoxide. Construction of the Geysers steamfield component will also cause short-term emissions of nitrogen oxides exceeding threshold levels. Although mitigation will reduce emissions, the impact would still be significant.

Operational emissions will not be significant for any of the alternatives. Increased emissions from the expansion of the headworks were determined to exceed trigger levels, but a screening-level risk analysis performed as part of a previous environmental analysis showed that toxic emissions will not exceed a cancer risk of one in one million, and will therefore not be significant. None of the Project components is expected to have significant odor impacts, but previous analysis of sludge handling facilities has shown that there may be significant odor problems associated with increased sludge production.

Noise

(Refer to Chapter 4.13 of the Draft EIR/EIS.)

All of the alternatives except the Laguna Discharge option will have significant temporary noise impacts associated with construction of pipelines, pump stations, and/or reservoirs. Noise from construction traffic, although temporary, will also be significant for the South County, West County, Geysers, and Russian River Discharge alternatives. Pump stations associated with the South County, West County, and Geysers alternatives will all have significant long-term operational impacts. Although mitigation will reduce noise levels, the increase in noise levels in rural areas will still be perceptible, and will be an unavoidable adverse impact.

Visual Resources

(Refer to Chapter 4.14 of the Draft EIR/EIS.)

Project impacts on visual resources were evaluated based upon the changes in views from public viewpoints (such as scenic corridors, designated scenic landscape units, roadways, parks, or recreation areas) up to three miles away, and from private residences up to 2,000 feet away. Significant impacts will occur along pipeline routes because of the strong visual contrast resulting from the disturbance of the landscape edge from grading and removal of vegetation.

Significant impacts occur at the reservoir sites due to one or more of the following: 1) strong contrast of the dam face with the surrounding landscape; 2) obstruction by the dam face of focal views of ridgelines and valleys; and 3) displacement of mature stands of trees. The pump stations will also have potential visual impacts due to their contrast with surrounding agricultural and rural environments, particularly in foreground views. These impacts will affect both public viewpoints and private residences.

Mitigation reduces the impacts related to visual contrast. However, there is no mitigation available for permanent view obstruction or displacement of mature stands of trees. Facilities at the Geysers, irrigation, and the discharge outfall on the Russian River will not result in significant visual impacts.

Cultural Resources and Paleontology

(Refer to Chapter 4.15 of the Draft EIR/EIS.)

Project impacts to cultural resources were evaluated by establishing known resources on affected properties and estimating unknown resources (potentially existing but not yet discovered), through a sensitivity analysis for the agricultural irrigation areas. A records search was conducted for all affected properties, and a complete field survey was conducted for the storage reservoir sites.

The study area is rich in cultural resources of various kinds; only the Laguna Discharge Alternative avoids impacts because it involves no construction. Types of resources found include prehistoric and historic archaeological sites, architectural historical sites and settings, and historic landscapes. See Table 1-8 which displays the number of known sites for each alternative.

Mitigation consists of construction monitoring, avoidance, documentation, evaluation, relocation, and/or education, as appropriate. Although some resources, such as those at Tolay and Two Rock reservoir sites are extensive, and mitigation would be time consuming, all impacts will be mitigated to a level below significance.

Table 1-8. *Tolay and Two Rock reservoir sites have especially valuable cultural resources.*

Known Cultural Resources Impacted

1 - No Action Alternative	0
2A - Tolay Extended	248
2B - Adobe /Lakeville	247
2C - Tolay Confined	235
2D - Sears Point/Lakeville	245
3A - Two Rock	232
3B - Bloomfield	203
3C - Carroll Road	197
3D - Valley Ford	191
3E - Huntley	196
4 - Geysers Recharge	52
5A - Russian River Discharge	2
5B - Laguna Discharge	0

The paleontology section analyzes the potential disturbance of unknown vertebrate paleontologic (fossil) resources. This analysis was based on review of pertinent geologic mapping and known locations of potential fossil-bearing rock units. These rock units are found throughout the study area, resulting in potentially significant impacts for all alternatives, except the Laguna Discharge Alternative, which does not involve any construction. Proposed mitigation includes construction monitoring for vertebrate paleontologic resources, salvage, evaluation, and education, as appropriate, and will reduce impacts to a level below significance.

Public Services, Utilities, and Recreation

(Refer to Chapter 4.16 of the Draft EIR/EIS.)

No significant impacts are identified for public services, except for the No Action Alternative. If the Project is not implemented, the City will not be able to supply sewage treatment and disposal in accordance with its General Plan and the existing lack of reliable capacity would continue. This is considered a significant impact.

Energy

(Refer to Chapter 4.17 of the Draft EIR/EIS.)

Energy will be used to pump reclaimed water for all alternatives except the

Laguna Discharge Alternative. However, none of the alternatives has significant energy impacts. The Geysers project will generate more energy than will be used for pumping.

Socio-economics

(Refer to Chapter 4.18 of the Draft EIR/EIS.)

Several dwelling units will be lost due to construction of the storage reservoirs; this loss is considered a significant housing impact.

A significant service charge increase (see Table 1-9) for sewage treatment would occur for users throughout the Subregional System if the South or West County Reclamation Alternatives or the Geysers Recharge Alternative is implemented. No feasible mitigation has been identified.

Demand fees (hookup fees) will also increase substantially for these same alternatives (see Table 1-10).

Due to provision of irrigation, the South and West County Reclamation Alternatives will increase the gross value of all fruit, vegetable, wine grape, and forage crops as shown in Table 1-11. Sebastopol irrigation will add even more to the value of crops, if most apple growers switched to the higher yielding new dwarf and semi-dwarf apple varieties.

The value of increased local dairy forage production will go beyond the gross crop values shown in this analysis if the ability to grow local forage and pasture ensures the long-term survival of the dairy industry in Sonoma and northern Marin counties.

Table 1-9. **Estimate of Maximum Additional Service Charge**

Average Monthly Service Charge per Single Family Residence

1	No Action (No Project)	0
2A	So. Co.—Tolay Extended	$33.90
2B	So. Co.—Adobe/Lakeville	$34.30
2C	So. Co.—Tolay Confined	$36.70
2D	So. Co.—Lakeville/Sears Point	$42.40
3A	W. Co.—Two Rock	$23.70
3B	W. Co.—Bloomfield	$25.70
3C	W. Co.—Carroll Road	$24.60
3D	W. Co.—Valley Road	$25.20
3E	W. Co.—Huntley	$24.50
4	Geysers Recharge	$74.40
5A	Russian River Discharge	$2.20
5B	Laguna Discharge	$0.70

Table 1-10. **Estimate of Additional Demand Fee**

Demand Fee per Single Family Residence or Equivalent

1	No Action (No Project)	($3,700)
2A	So. Co.—Tolay Extended	$7,300
2B	So. Co.—Adobe/Lakeville	$8,600
2C	So. Co.—Tolay Confined	$8,700
2D	So. Co.—Lakeville/Sears Point	$9,400
3A	W. Co.—Two Rock	$5,100
3B	W. Co.—Bloomfield	$6,300
3C	W. Co.—Carroll Road	$5,000
3D	W. Co.—Valley Ford	$5,300
3E	W. Co.—Huntley	$5,400
4	Geysers Recharge	$3,900
5A	Russian River Discharge	($1,800)
5B	Laguna Discharge	($2,400)

Amounts in parentheses indicate a reduction in demand fee.

Annual Gross Production Value of Irrigated Crops

(thousands of dollars)

	Low Tech Scenario	Medium Tech Scenario	High Tech Scenario
West County	$ 3,100	$20,400	$ 71,900
West County w/Sebastopol	$52,800	$65,500	$102,400
South County	$ 2,600	$18,000	$ 35,000
Sounth County w/Sebastopol	$53,400	$65,100	$ 82,200

Table 1-11. *Irrigation water will greatly increase the value of fruit, vegetable, pasture, and forage crops.*

Table 1-12.

Annual Net Economic Impacts

		Impact (1,000s)	Total Employment
1	No Action (No Project)	($1,482,900)	(27,100)
2A	So. Co.—Tolay Extended	$120,100	3,500
2B	So. Co.—Adobe/Lakeville	$119,000	3,500
2C	So. Co.—Tolay Confined	$117,600	3,500
2D	So. Co.—Lakeville/Sears Point	$115,100	3,400
3A	W. Co.—Two Rock	$124,300	3,600
3B	W. Co.—Bloomfield	$122,900	3,600
3C	W. Co.—Carroll Road	$123,900	3,600
3D	W. Co.—Valley Road	$123,500	3,600
3E	W. Co.—Huntley	$123,800	3,600
4	Geysers Recharge	($38,000)	(1,100)
5A	Russian River Discharge	($1,600)	0
5B	Laguna Discharge	($600)	0

Amounts in parentheses indicate an adverse impact.

If the current dairy price support system remains in place, the two factors that most threaten the dairy industry in the North Bay are: the cost of feed and urban pressures that increase the price of agricultural land and opportunities for urban/agricultural conflicts. The availability of reclaimed water to dairy farmers will substantially reduce the cost of imported feeds and improve long-term viability of the dairy industry.

When the economic effects of increased agricultural value, increased expenditures for ongoing operations and maintenance, and impacts of increased service charges and demand fees are considered, the Reclamation Alternatives will generate annual net economic benefits of $115 to $124 million in the Sonoma and Marin county economies, including up to 3,600 new jobs (see Table 1-12).

The Geysers Alternative is projected to have the largest cost due to the high operation and maintenance costs. These costs will be partially offset by the payments by the Geysers operators for reclaimed water as well as the additional property tax revenue and royalty payments that would accrue to Sonoma County. No offers have yet been made by the Geysers operators, so this analysis does not reflect the net economic benefit to be derived from this alternative.

The Geysers Recharge and Discharge alternatives generate very little economic benefit to the region, but still generate costs. Most of the economic benefit of the Geysers Recharge Alternative goes outside the Sonoma and Marin economies. The socio-economic analysis

shows that impacts on Russian River tourism of increased discharge are primarily dependent upon publicity regarding the discharge, rather than the discharge itself, and are therefore unpredictable.

If the Project is not implemented, that is, the No Action Alternative is chosen, it is likely that the North Coast Regional Water Quality Control Board will prevent further sewage hookups after December 1997, thereby creating a building moratorium. The economic analysis indicates that some 27,100 future jobs and 28,200 future housing units will be lost. Overall, the economic impact of the No Action Alternative will be greater than a loss of future jobs and houses; the income growth of existing residents and workers will be adversely impacted, as well.

Inundation Due to Dam Failure

(Refer to Chapter 4.19 of the Draft EIR/EIS.)

The potential for dam failure caused by a seismic event, unstable slope conditions, or damage from corrosive or expansive soils is extremely remote. The California Department of Water Resources, Division of Safety of Dams is the regulatory agency with jurisdiction over the design, construction, and operation of dams in California to prevent failure and to safeguard life and protect property. California currently has the most stringent dam safety design and construction review standards in the country, and adherence to these standards greatly reduces the probability of dam failure and is protective of public safety. Since the Division of Safety of Dams was established, three notable dam failures have occurred in California, and only one (Baldwin Hills Reservoir in 1963) resulted in loss of life.

Subsequent to the San Fernando earthquake of 1971, where the Lower Van Norman Dam was damaged, but did not fail, a seismic inspection and rehabilitation program was instituted. During the Loma Prieta earthquake, several dams were damaged, but no uncontrolled releases of water occurred. Current standards for dam construction are even more strict than the standards for any of the dams that have failed.

The dam and reservoir design will virtually eliminate the possibility of failure by the major causes of dam failure. Overtopping will be preempted because dams will be sited in small tributary watersheds and spillways will be sized to accommodate the probable maximum flood. The possibility of foundation failure will be greatly reduced by construction on a bedrock foundation and installation of an internal drainage system. During operation, the reservoirs will be visually inspected on a regular basis to ensure that the embankments, control structures, access roads, and monitoring instrumentation are maintained. All impediments will be removed from the spillway and other control structures as soon as they are observed.

In the highly unlikely event of a catastrophic dam failure, all reservoirs have housing or facilities within their projected inundation area, which will be flooded and/or destroyed.

Table 1-13

Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
Land Use														
1.5.3. The storage reservoir component may be an incompatible land use type in a designated quarry area.			⊙			●								2.4.1. Removal of aggregate resources prior to construction.
1.6.7. The pump station component may convert public open space for project facilities.											⊙			2.3.1. Replacement of open space easements.
Agriculture														
2.5.1. The storage reservoir component may cause loss of farmland.		●	●	●		●								No feasible mitigation has been identified.
2.5.2. The storage reservoir component may cause Williamson Act contracts to be canceled.							●			●				No feasible mitigation has been identified.
2.6.1. The pump station component may cause loss of farmland.		●	●	●	●	●	●	●	●	●	●			No feasible mitigation has been identified.
2.7.3. The agricultural irrigation component may reduce agricultural soil productivity due to erosion of topsoil.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.3.2 Restrict approval of agricultural irrigation contracts. 2.3.3. Agricultural Irrigation Demonstration Program
Geology, Soils, and Seismicity														
3.4.1. The pipeline component may be located within an area of unstable slope conditions.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	●			2.3.4. Slope Stabilization Design 2.3.7. Slope Monitoring and Response System 2.3.8. Earthquake Preparedness and Emergency Response Plan
3.4.2. The pipeline component may be subject to ground rupture due to location near the surface trace of an active fault.		●	●	●	●	●	●	●	●	●	●			2.3.8. Earthquake Preparedness and Emergency Response Plan

Table 1-13

Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
3.4.3. The pipeline component may be located in areas with soils and groundwater conditions that are susceptible to liquefaction during an earthquake.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙		2.3.5. Liquefaction Stabilization Design
3.4.7. The pipeline component may be exposed to damage due to expansive soils.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙			2.4.8. Standard Engineering Methods for Expansive Soils
3.4.8. The pipeline component may be exposed to damage due to corrosive soils.		⊙	⊙	⊙	⊙									2.3.6. Standard Engineering Methods for Corrosive Soils
3.5.1. The storage reservoir component may be located within an area of unstable slope conditions.		●	●	●	●									2.3.4. Slope Stabilization Design 2.4.2. Remove weak surficial deposits from reservoir footprint.
3.5.7. The storage reservoir component may be exposed to damage due to expansive soils.		⊙	⊙	⊙	⊙									2.4.2. Remove weak surficial deposits from reservoir footprints. 2.4.3. Standard Engineering Methods for Expansive Soils
3.6.3. The pump stations component may be located in areas with soils and groundwater conditions that are susceptible to liquefaction during an earthquake.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙			2.3.5. Liquefaction Stabilization Design
3.6.7. The pump stations component may be exposed to damage due to expansive soils.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙			2.4.3. Standard Engineering Methods for Expansive Soils
3.7.8. The agricultural irrigation component may be exposed to damage due to corrosive soils. Bay flats and Lakeville irrigation areas.		⊙	⊙	⊙	⊙									2.3.6. Standard Engineering Methods for Corrosive Soils
3.8.1 The geysers steamfield component may be located in an area of unstable slope conditions											⊙			2.3.4 Slope Stabilization Design

Table 1-13

Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
3.9.3. The discharge component may be located in areas with soils and groundwater conditions that are susceptible to liquefaction during an earthquake.												⊙		2.3.5. Liquefaction Stabilization Design
Surface Water Hydrology														
4.4C The Project plus cumulative projects may cause a cumulative increase in the maximum flood elevation in the Russian River.	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	2.5.10. Discharge prohibition during flood state is proposed to mitigate for the project's contribution to a flooding impact.
Groundwater														
5.5.1. The storage reservoir component may degrade groundwater quality at existing wells, resulting in public health hazards.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.3.12. Provide replacement water supply for affected wells.
5.5.2. The storage reservoir component may degrade groundwater quality at future drinking water wells, resulting in a public health hazard.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.3.12. Provide replacement water supply for affected wells.
5.5.3. The storage reservoir component may cause groundwater mounding or increase groundwater levels that cause surface discharge in a non-stream environment.							⊙	⊙	⊙	⊙				2.5.9. Implement a septic system monitoring and replacement program.
5.5.4. The storage reservoir component may lower groundwater levels at existing wells.			⊙		⊙	⊙	⊙	⊙	⊙	⊙				2.3.13. Monitor groundwater levels and provide replacement water supply.
5.5.5. The storage reservoir component may lower groundwater levels in areas that could have been developed for future water supply.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.3.13. Monitor groundwater levels and provide replacement water supply.
Surface Water Quality														
6.5.1. Ammonia. The storage reservoir component may cause numeric-based criteria to be exceeded.		⊙		⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.5.3 Control program for hydrogen sulfide, ammonia, and dissolved oxygen.

Table 1-13

Summary of Significant Impacts and Mitigation

	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		
Impact	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	Mitigation Measures
6.5.1. Dissolved oxygen. The storage reservoir component may cause numeric-based criteria to be exceeded.		⊙		⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.5.3 Control program for hydrogen sulfide, ammonia, and dissolved oxygen.
6.5.1. Hydrogen sulfide. The storage reservoir component may cause numeric-based criteria to be exceeded.		⊙		⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.5.3 Control program for hydrogen sulfide, ammonia, and dissolved oxygen.
6.5.3. Salinity, ammonia, dissolved oxygen, planktonic algae, benthic algae, and metals. The storage reservoir component may cause special-site criteria to be exceeded.						●	●	●	●	●				No feasible mitigation has been identified.
6.7.1. Dissolved copper. Agricultural irrigation may cause numeric-based criteria to be exceeded.						⊙	⊙	⊙	⊙	⊙				2.5.2 Control program for dissolved copper levels in West County creeks.
6.7.3. Salinity, ammonia, dissolved oxygen, planktonic algae, benthic algae, and metals. The agricultural irrigation may cause the special site criterion to be exceeded.						●	●	●	●	●				No feasible mitigation has been identified.
6.9.1. Conductivity. Discharge component may cause numeric-based criteria to be exceeded.												●		No feasible mitigation has been identified.
6.9.1. Cyanide. Discharge component may cause numeric-based criteria to be exceeded.	●												⊙	2.5.5. Cyanide Monitoring and Source Control Program
6.9.1. Dissolved oxygen. Discharge component may cause numeric-based criteria to be exceeded.													●	No feasible mitigation has been identified.
6.9.2. Algal growth. Design discharge component may cause narrative-based criteria to be exceeded.	●	●	●	●	●	●	●	●	●	●	●	●	●	2.5.4 Discharge Operations
6.9.2. Algal growth (beneficial) Discharge scenarios may cause narrative-based criteria to be exceeded.	+	+	+	+	+	+	+	+	+	+	+	+	+	None required.

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Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
6.9.2. Turbidity. Discharge scenarios may cause narrative-based criteria to be exceeded.												●	●	2.5.4 Discharge Operations
6.9.2. Turbidity (beneficial). Discharge scenarios may cause narrative-based criteria to be exceeded.	●												⊙	None required.
6.9.2. Waste Reduction Strategy - Ammonia-Nitrogen. Discharge scenarios may cause narrative-based criteria to be exceeded.	●												⊙	2.5.6 Total and Ammonia Nitrogen Source Control Program
6.9.2. Waste Reduction Strategy - Total Nitrogen. Discharge scenarios may cause narrative-based criteria to be exceeded.	●												⊙	2.5.6 Total and Ammonia Nitrogen Source Control Program
6.9.2. Toxicity. Discharge component may cause narrative-based criteria to be exceeded.	●												⊙	2.5.7. Toxicity Control Program
Public Health and Safety														
7.4.2. The pipeline component may be constructed on or within a known hazardous waste site.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙			2.3.15. Construction Management Program
7.5.1. The storage reservoir component may expose the public to chemical, radionuclides, or pathogens at concentrations detrimental to human health.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.3.12. Provide replacement water supply for affected wells.
7.5.6. The storage reservoir component may increase the potential exposure of the public to disease vectors.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.3.16. Mosquito Prevention Program
7.6.2. The pump station component may be constructed on or within a known hazardous waste site.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙			2.3.15. Construction Management Program
7.7.2. The agricultural irrigation component may expose workers or the public to hazards from a known hazardous waste site.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.3.15. Construction Management Program

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Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
7.8.2. The geysers steamfield component may expose workers or the public to hazards from a known hazardous waste site.											⊙			2.3.15. Construction Management Program
Terrestrial Biological Resources														
8.5.3. Storage reservoir component may cause loss of active raptor nest sites.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.4.5. Active Raptor Nest Location and Monitoring Program
8.5.5. Storage reservoir component may cause loss of sensitive native terrestrial plant communities.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.3.11. Sensitive Resource Conservation Program
8.9.5. Discharge component may cause permanent loss of sensitive native terrestrial plant communities												⊙		2.3.11. Sensitive Resource Conservation Program
8.2C. The Project plus cumulative projects may cause a loss of individuals of CNSPS List 2, 3, or 4 terrestrial plant species.						⊙				⊙				2.4.15. Sensitive Plant Translocation Program
8.4C. The Project plus cumulative projects may cause permanent loss of sensitive terrestrial wildlife habitat.		●	●	●	●	●	●	●	●	●				No feasible mitigation has been identified.
8.7C. The Project plus cumulative projects may result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation).	●	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙		⊙	2.4.16. Ecological Risk Monitoring and Source Control Program
Aquatic Biological Resources														
9.5.1. The storage reservoir component may cause loss of individuals or occupied habitat of endangered, threatened, or rare aquatic wildlife or plant species.		⊙	⊙	⊙	⊙	⊙	⊙		⊙	⊙				2.3.11. Sensitive Resource Conservation Program 2.4.4. California Red-legged Frog Capture and Relocation Program
9.5.3. The storage reservoir component may cause loss of potential or occupied habitat of aquatic species of concern.		⊙		⊙										2.3.11. Sensitive Resource Conservation Program

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Summary of Significant Impacts and Mitigation

	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		
Impact	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	Mitigation Measures
9.5.4. The storage reservoir component may cause permanent loss of sensitive aquatic plant communities and associated wildlife habitats.						⊙								2.3.11. Sensitive Resource Conservation Program
9.5.5. The storage reservoir component may cause permanent loss of aquatic habitat.		⊙	⊙	⊙	⊙			⊙						2.3.11. Sensitive Resource Conservation Program
9.5.6. The storage reservoir component may cause a change in the physical condition of aquatic habitat in the Estero Americano or the Estero de San Antonio within the Gulf of the Farallones National Marine Sanctuary.						●	●	●	●	●				No feasible mitigation has been identified.
9.5.8. The storage reservoir component may cause a change in stream flows, affecting aquatic habitat or aquatic life downstream from proposed dam sites.		⊙	⊙	⊙	⊙		⊙	⊙	⊙					2.3.11. Sensitive Resource Conservation Program
9.7.6. The storage reservoir component may cause a change in the physical condition of aquatic habitat in the Estero Americano or the Estero de San Antonio within the Gulf of the Farallones National Marine Sanctuary.						●	●	●	●	●				No feasible mitigation has been identified.
9.2C. The cumulative projects may cause a loss of individuals of CNPS List 2, 3, or 4 aquatic plant species.										⊙				2.4.15. Sensitive Plant Relocation Program
9.9C. The Project plus cumulative projects may result in ecological risk to aquatic plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation).	⊙											⊙	⊙	2.4.16. Ecological Risk Monitoring and Source Control Program
Jurisdictional Wetlands Resources														
10.4.1. The pipeline component may destroy wetlands or other waters of the U.S.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙		2.3.10 Limit Construction Disturbance
10.5.1. The storage reservoir component may destroy wetlands or other waters of the U.S.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.3.11 Sensitive Resource Conservation Program

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Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
10.9.1. The discharge component may destroy wetlands or other waters of the U.S.												⊙		2.3.11 Sensitive Resource Conservation Program
Transportation														
11.4.1. Traffic from construction or operations of the pipeline component may cause congestion along access roads		●	●	●	●	●	●	●	●	●	●			No feasible mitigation has been identified.
11.4.2. Lane closures due to construction of the pipeline component may delay traffic, delay transit services, restrict access, increase hazards, and reroute traffic, including emergency vehicles.		●	●	●	●	●	●	●	●	●	●	●		No feasible mitigation has been identified.
11.4.4. The pipeline component may cause damage to public or private roadbeds.											●			No feasible mitigation has been identified.
11.5.1. Traffic from construction or operation of the storage reservoir component may cause congestion on access roads.		●	●	●	●	●	●	●	●	●				No feasible mitigation has been identified.
11.8.1. Traffic from construction of the geysers steamfield component may cause congestion on access roads.											●			No feasible mitigation has been identified.
Air Quality														
12.2.3. The headworks expansion component may exceed trigger toxic emissions levels.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	A screening level health risk assessment determined perchloroethylene levels will be less than significant.
12.2.5. The headworks expansion component may cause odors.	●	●	●	●	●	●	●	●	●	●	●	●	●	No feasible mitigation has been identified.

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Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
12.4.1. The pipeline component may exceed emission threshold levels.		●	●	●	●	⊙	⊙	⊙	⊙	⊙	⊙			2.4.1 Dust Control Program 2.4.10 Vehicle and Equipment Exhaust Control Program
12.5.1. The storage reservoir component may exceed emission threshold levels.		●	●	●	●	●	●	●	●	●				2.4.10 Vehicle and Equipment Exhaust Control Program 2.4.11 Dust Control Program
12.8.1. The geysers steamfield component may exceed emission threshold levels.											●			2.4.10 Vehicle and Equipment Exhaust Control Program
Noise														
13.4.1. Construction of pipeline component may expose the public to high noise levels.		●	●	●	●	●	●	●	●	●	●	●		2.4.9. Construction Noise Control Measures
13.4.3. Construction of the pipeline component may cause high noise levels from the construction traffic.		●	●	●	●	●	●	●	●	●	●	●		2.4.9. Construction Noise Control Measures
13.5.1. Construction of the storage reservoir component may expose the public to high noise levels.		⊙	●	⊙	●	●				●				2.4.9. Construction Noise Control Measures
13.5.3. Construction of the storage reservoir component may cause high noise levels from the construction traffic.		●	●	●	●	●	●	●	●	●				2.4.9. Construction Noise Control Measures
13.6.1. Construction of the pump station component may expose the public to high noise levels.		●	●	●	●	●	●	●	●	●	●			2.4.9. Construction Noise Control Measures
13.6.2. Operation of the pump station component may expose the public to high noise levels.		●	●	●	●	●	●	●	●	●	●			2.3.17. Incorporate noise control measures into the final design of the pump station.
13.7.1. Construction of the agricultural irrigation component may expose the public to high noise levels.		●	●	●	●	●	●	●	●	●				2.4.9. Construction Noise Control Measures
13.8.3. Construction of the Geysers steamfield component may cause high noise levels from construction traffic.											●			No feasible mitigation has been identified.

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Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
Visual Resources														
14.4.1. The pipeline component may be inconsistent with the Sonoma County General Plan Open Space Element regarding Community Separator Areas.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙			2.3.10. Limit construction disturbance.
14.4.2. The pipeline component may be inconsistent with the Sonoma County General Plan Open Space Element regarding Scenic Landscape Units.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙		2.3.9. Adjust pipeline alignments. 2.3.10. Limit construction disturbance.
14.4.3. The pipeline component may be inconsistent with the Sonoma County or city General Plans regarding designated Scenic Corridors.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙		2.3.9. Adjust pipeline alignments. 2.3.10. Limit construction disturbance.
14.4.5. The pipeline component may cause adverse effects on foreground or middleground views from a high volume travelway, recreation use area, or other public use area.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	●	⊙		2.3.9. Adjust pipeline alignments. 2.3.10. Limit construction disturbance.
14.4.6. The pipeline component may cause an adverse effect on foreground or middleground views from one or more private residence.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙		2.3.9. Adjust pipeline alignments. 2.3.10. Limit construction disturbance.
14.5.2. The storage reservoir component may be inconsistent with the Sonoma County General Plan Open Space Element regarding Scenic Landscape Units.			⊙											2.4.6. Screen concrete diversion channels, pump stations, and other facilities. 2.4.7. Establish tree screening. 2.4.8. Revegetate face of reservoir dam.
14.5.3. The storage reservoir component may be inconsistent with the County Open Space Element regarding Scenic Corridors.		●					●	●	●					2.4.6. Screen concrete diversion channels, pump stations, and other facilities. 2.4.7. Establish tree screening. 2.4.8. Revegetate face of reservoir dam.

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Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
14.5.5. The storage reservoir component may cause adverse effects on foreground or middleground views from a high volume travelway, recreation use area, or other public use area.			⊙		●		⊙			⊙				2.4.6. Screen concrete diversion channels, pump stations, and other facilities. 2.4.7. Establish tree screening. 2.4.8. Revegetate face of reservoir dam.
14.5.6. The Storage reservoir component may cause an adverse effect on foreground or middleground views from one or more private residences.		●	●	●	●	●	●	●	●	⊙				2.4.6. Screen concrete diversion channels, pump stations, and other facilities. 2.4.7. Establish tree screening. 2.4.8. Revegetate face of reservoir dam.
14.6.2. The pump station component may be inconsistent with the Sonoma County General Plan Open Space Element regarding Scenic Landscape Units.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.4.6. Screen concrete diversion channels, pump stations, and other facilities.
14.6.3. The pump station component may be inconsistent with the County Open Space Element regarding Scenic Corridors.		●	●	●	●	●	●	●	●	●	●			2.4.6. Screen concrete diversion channels, pump stations, and other facilities.
14.6.4. The pump station component may be inconsistent with minimum building setbacks for structures along Sonoma County designated scenic corridors.		●	●	●	●	●	●	●	●	●	●			2.4.6. Screen concrete diversion channels, pump stations, and other facilities.
14.6.5. The pump station component may cause adverse effects on foreground or middleground views from a high volume travelway, recreation use area, or other public use area.		●	●	●	●	●	●	●	●	●	●			2.4.6. Screen concrete diversion channels, pump stations, and other facilities.
14.6.6. The pump station component may cause an adverse effect on foreground or middleground views from one or more private residences.		●	●	●	●	●	●	●	●	●	●			2.4.6. Screen concrete diversion channels, pump stations, and other facilities.

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Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
Cultural Resources and Paleontology														
15.4.1. The pipeline component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙		2.3.18. Identification, evaluation, and avoidance of cultural resources.
15.4.2. The pipeline component may disturb unknown archaeological resources.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙		2.4.12. Protect undiscovered cultural resource sites.
15.4.3. The pipeline component may disturb unknown vertebrate paleontologic resources.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙		2.4.13 Protect vertebrate paleontologic resources.
15.5.1. The storage reservoir component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.3.18. Identification, evaluation, and avoidance of cultural resources.
15.5.2. The storage reservoir component may disturb unknown archaeological resources.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.4.12. Protect undiscovered cultural resource sites.
15.5.3. The storage reservoir component may disturb unknown vertebrate paleontologic resources.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.4.13. Protect vertebrate paleontologic resources.
15.6.1. The pump station component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙			2.3.18. Identification, evaluation, and avoidance of cultural resources.
15.6.2. The pump station component may disturb unknown archaeological resources.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙			2.4.12. Protect undiscovered cultural resource sites.
15.6.3. The pump station component may disturb unknown vertebrate paleontologic resources.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.4.13. Protect vertebrate paleontologic resources.

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Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
15.7.1. The agricultural irrigation component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.3.18. Identification, evaluation, and avoidance of cultural resources.
15.7.2. The agricultural irrigation component may disturb unknown archaeological resources.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.4.12. Protect undiscovered cultural resource sites.
15.7.3. The agricultural irrigation component may disturb unknown vertebrate paleontologic resources.		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				2.4.13. Protect vertebrate paleontologic resources.
15.8.1. The geysers steamfield component may disturb known potentially eligible National Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources.											⊙			2.3.18. Identification, evaluation and avoidance of cultural resources.
15.8.2. The geysers steamfield component may disturb unknown archaeological resources.											⊙			2.4.12. Protect undiscovered cultural resource sites.
15.9.2. The discharge component may disturb unknown archaeological resources.												⊙		2.4.12. Protect undiscovered cultural resource sites.
15.9.3. The discharge component construction may disturb unknown vertebrate paleontologic resources.												⊙		2.4.13. Protect vertebrate paleontologic resources.
Public Services, Utilities and Recreation														
16.1.1. The No Action Alternative may increase demand for public services such that accepted service standards are not maintained.	●													None.
16.4.2. The pipeline component may disrupt public services such that accepted service standards are not maintained.		●	●	●	●	●	●	●	●	●	●	●		2.4.9. Construction Noise Control. 2.4.14. Coordinate fire response service.
Energy														
There are no significant impacts.														

Table 1-13

Summary of Significant Impacts and Mitigation

Impact	No Action	South County Irrigation				West County Irrigation					Geysers	Discharge		Mitigation Measures
	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B	
Socio-economics														
18.1. The Project may increase the service charge for wastewater.		●	●	●	●	●	●	●	●	●	●			No feasible mitigation has been identified.
18.2. The Project may result in loss of homes due to construction of facilities.		●	●			●		●	●	●				No feasible mitigation has been identified.

Note: No mitigation is proposed for the significant impacts of the No Action Alternative.

Level of Significance:

⊙ Significant impact before mitigation; less than significant impact after mitigation

● Significant impact before and after mitigation

\+ Beneficial impact

Alternatives:

1 No Action (No Project)
2A Tolay Extended
2B Adobe Road/Lakeville Hillside
2C Tolay Confined
2D Sears Point/Lakeville Hillside
3A Two Rock
3B Bloomfield
3C Carroll Road
3D Valley Ford
3E Huntley
4 Geysers Recharge
5A Discharge to Russian River
5B Discharge to the Laguna

1.10 NEPA/CEQA Required Sections

(Refer to Chapter 5 of the Draft EIR/EIS.)

Growth-inducing Impacts

(Refer to Chapter 5.3 of the Draft EIR/EIS.)

Growth inducement is defined by the CEQA Guidelines as a project's potential for fostering of economic or population growth or the construction of new housing. Growth inducement may result from direct employment, population, or housing growth; secondary or indirect growth; or provision of new infrastructure which removes obstacles to growth.

As shown in Table 1-14, the maximum contribution of any of the Project alternatives toward growth of employment, housing, or population is small compared to the total growth expected in Sonoma County over the life of the Project. Therefore, none of the Project alternatives is growth-inducing with regard to employment, housing, or population.

Table 1-14.
Growth resulting from the Project is a fraction of the growth already expected in the healthy local economy.

Growth-inducing Factors	Maximum Contribution of a Project Alternative	Expected Growth in Sonoma County over the Life of the Project
Total employment	3,700	78,300
Housing units	2,400	25,900
Population	5,800	44,800

The primary types of infrastructure which are potentially growth-inducing are roads, communication facilities, sewage treatment capacity, and water supply facilities. The Project alternatives do not include substantial improvements in either transportation or communications facilities.

The new sewage treatment and disposal capacity supplied by this Project responds directly to the growth approved in each of the member jurisdictions' general plans. Capacity will increase from 18 mgd to 21 mgd average dry weather flow. Experts disagree about the growth-inducing effect of such an expansion. Certainly, a primary obstacle to growth is being removed by provision of the increased capacity. However, the Project is not the engine driving the growth. The healthy regional economy, local resources, and existing labor force, together with the desire of the population as expressed in the General Plans, are responsible for the economic growth of the region. From this perspective, the Project accommodates growth trends rather than inducing growth on its own.

One of the mitigation measures will supply new potable water to parcels downgradient of the storage reservoirs, if their groundwater is shown to be affected by the reservoir. At maximum, 84 parcels will receive a new water supply. All such parcels will have to be consistent with the Sonoma County General Plan and applicable zoning, therefore this secondary impact is growth-accommodating rather than growth-inducing.

Environmentally Superior Alternative

(Refer to Chapter 5.5 of the Draft EIR/EIS.)

The California Environmental Quality Act requires the identification of an Environmentally Superior Alternative; that is, the alternative which has no significant effect or has the least significant effect on the environment. For reference, significance is determined based on substantial or potentially substantial adverse changes of any of the physical conditions due to the Project. The degree of change is evaluated against existing environmental conditions.

The environmentally superior alternative is Alternative 5B, the Laguna Discharge Alternative. This alternative causes the least change on the environment when compared with the other alternatives. This alternative does not impact wetlands and does not require the construction of new facilities which change the existing environment. This alternative discharges reclaimed water to the Laguna de Santa Rosa which flows to the Russian River near the Sonoma County Water Agency water collection system. The unavoidable effects of Laguna Discharge include a further decrease of dissolved oxygen in the Laguna de Santa Rosa and an increase in biostimulatory substances, as measured by benthic and planktonic algae, in the Laguna de Santa Rosa and Russian River. All but one of these unavoidable impacts occur in less than one month every eight years. The unavoidable impact on benthic algae occurs in the lower-most quarter-mile reach of Santa Rosa Creek more frequently, however beneficial impacts on algae will occur more frequently than adverse impacts. With implementation of mitigation and cumulative projects (including nitrogen load reduction throughout the Laguna), Alternative 5B would have a less than significant impact.

The No Action Alternative is similar to Alternative 5B. This alternative has greater water quality impacts, because it does not provide mitigation included in the other alternatives. The No Action Alternative not only impacts biostimulatory substances and dissolved oxygen similarly to the Laguna Discharge, but also causes exceedance of standards for cyanide and toxicity, and non-attainment of the Regional Board's Waste Reduction Strategy.

The reclamation alternatives and the Geysers Alternative have fewer water quality impacts on the Russian River. However, these alternatives require physical changes to the existing environment which cause significant and unavoidable effects on other resources within Sonoma and Marin counties.

Although Alternative 5B is considered environmentally superior (as defined above), any conclusion regarding the environmentally superior alternative should not be confused with an analysis of how each alternative may achieve the Project's purpose and need. The Draft EIR/EIS has noted beneficial effects of the alternatives, including increased prime farmland, generation of electricity, and economic stimulation. The City will consider and weigh these benefits and

the environmental effects against the purpose and need of the project during the selection of the preferred Project.

The National Environmental Policy Act requires the identification of the Environmentally Preferable Alternative from the range of alternatives considered in the Record of Decision. The environmentally preferable alternative is the alternative that will promote the National Environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources. The environmentally preferable alternative also balances population and resources and enhances the quality of renewable resources.

At this time the Corps has not selected the environmentally preferable alternative, nor has the City selected its preferred alternative. After certification of the Final EIR, the City will consider and select the preferred alternative. At that time, the Final EIS will be prepared which will identify both the environmentally preferable alternative and the preferred alternative.

1.11 Range of Discharge Evaluation

(Refer to Appendix A, Volume III of the Draft EIR/EIS))

As a means of evaluating the range of design discharge rates between 1% and 20% of river flow, the Range of Discharge Evaluation Appendix focuses on impacts resulting from design discharge rates of 5%, 10%, and 15% in relation to impacts from the 1% design discharge rate analyzed in the main body of the Draft EIR/EIS. These intermediate rates represent benchmarks within the range of design discharge rates greater than 1% but less than 20%. All of the discharges would be directly to the Laguna.

Description of Project Alternatives for Intermediate Discharge Rates

The average annual volume of reclaimed water discharged to the Laguna under intermediate discharge options is shown in Table 1-15.

Intermediate rates of discharge would reduce the requirement for reclaimed water storage and agricultural irrigation acreage by approximately 30 percent for a 5% discharge rate; 50 percent for a 10% discharge rate; and 75% for a 15% discharge rate. The reduction in storage requirements would mean that smaller pipelines could be built and smaller pumps could be provided at pump stations. With reductions in agricultural irrigation acreage, the length of pipeline and number of pump stations could also be reduced, although the actual reductions cannot be determined at this time because it is unknown which eligible properties will actually be irrigated. Consequently, the proposed irrigation acreage must be larger than theoretically required, and agricultural irrigation may occur in any of the irrigation areas.

Based upon the reduced storage requirements for the intermediate discharge rates, three alternatives would be eliminated from consideration. The Tolay Expanded reservoir (Alternative 2A) would be eliminated under the 10% and 15% discharge options because the reservoir would be too shallow to operate effectively.

Under each of the intermediate discharge rates, the reduced storage requirement allows the Adobe Road and Sears Point reservoirs to be large enough to serve the Project by themselves (rather than combining with Lakeville Hillside reservoir as in alternatives 2B and 2D). In addition, the storage requirement for a 15% discharge rate allows the Lakeville Hillside site to be large enough to serve the Project by itself.

Other Project components would not change under any of the intermediate discharge options.

Impacts of Intermediate Discharge Rates

The decrease in the size of the reservoirs due to reduced storage requirements would not result in a substantial change in impacts. Because the reservoirs are sited in valleys, the reduction in volume does not result in a proportional decrease in either dam height or water elevation. The area under construction

Volume of Reclaimed Water Discharge

Design Discharge Rate (as a Proportion of Russian River Flow)	**Average Volume of Reclaimed Water Discharged to Laguna** (October 1–May 14)
1 Percent	685 million gallons
5 Percent	1,825 million gallons
10 Percent	2,740 million gallons
15 Percent	3,490 million gallons
No Project	3,245 million gallons
Existing Conditions	3,735 million gallons
20 Percent	4,640 million gallons
The average volume of the Russian River from October 1 to May 14	341,000 million gallons

Table 1-15.

for a reservoir, which is the primary determinant for impacts, would not change substantially under any of the discharge options. Similarly, the reduction in size of pipelines or size of pumps in pump stations would not result in a smaller construction zone or level of construction activity. There would be some reduction in the operational noise level at pump stations, but not to a level less than significant.

The decrease in agricultural irrigation would result in decreased length of pipeline and number of pump stations. It is likely environmental impacts would also be reduced. However, because the actual properties to be irrigated are not known at this time for any of the discharge options, it is not possible fully to determine the degree of reduced impacts. Thus, even though the reduction in irrigated acreage for Alternative 2, South County, would be approximately 30 percent under a 5% option and nearly 60 percent under a 10% option, the reductions in some impacts would not necessarily be reduced proportionately, and depending on the actual location and characteristics of the properties to be irrigated, could be substantially more or less than the reduction in the total irrigation acreage. The significant impact of agricultural irrigation with regard to the numerical standard for dissolved copper for Alternative 3 (West County) would be avoided by the 5%, 10%, and 15% options. However, significant impacts on the esteros would not be avoided by any of the reduced irrigation options.

The elimination of a second reservoir for Alternatives 2B and 2D would eliminate impacts associated with that site including pipelines leading to the site as well as the pump station at the dam. Impacts for alternatives 2B and 2D, with only one reservoir each, would be reduced but not eliminated.

The increased river discharge (relative to a one percent design discharge) would not require a change in the size or location of the outfall structure in the Laguna. The increased discharge would increase impacts on the Laguna and Russian River related to streambank erosion, flooding, and water quality. However, the increases would not be sufficient to change the level of impacts from less than significant to significant for any of the Surface Water Hydrology criteria. Mitigation of the 5%, 10%, and 15% discharge options would not avoid significant adverse water quality impacts, but the cumulative projects scenario (nitrogen load reduction) combined with mitigation would avoid significant impacts. Study and control of aluminum in Santa Rosa reclaimed water would mitigate the only significant adverse cumulative impact.

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LIST OF TABLES

2 MITIGATION AND MONITORING PROGRAM

INTRODUCTION

This Chapter presents the Mitigation and Monitoring Program for the Santa Rosa Subregional Long-Term Wastewater Project. The purpose of placing the Mitigation and Monitoring Program at the front end of the EIR/EIS is to make clear to the reader the responsibilities of the City in implementing a Long-Term Project. The mitigation measures listed herein are required by law or regulation (Section 2.1); are adopted by the City as part of the Project (Section 2.2); or are recommended by the Harland Bartholomew & Associates consultant team.

Mitigation is defined by both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) as a measure which:

- Avoids the impact altogether by not taking a certain action or parts of an action.
- Minimizes impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifies the impact by repairing, rehabilitating, or restoring the impacted environment.
- Reduces or eliminates the impact over time by preservation and maintenance operations during the life of the Project
- Compensates for the impact by replacing or providing substitute resources or environments.

Mitigation measures discussed below have been identified in Chapter 4, Affected Environment and Environmental Consequences, as feasible and effective in mitigating Project-related environmental impacts. The effectiveness of each measure is identified in this Chapter and discussed in detail in Chapter 4.

Legal Basis

The legal basis for the development and implementation of a Mitigation and Monitoring Program lies within both the California Environmental Quality Act and the National Environmental Policy Act. CEQA Sections 21002 and 21002.1 state:

- Public agencies are not to approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects; and
- Each public agency shall mitigate or avoid the significant effects on the environment of projects that it carries out or approves whenever it is feasible to do so.
- CEQA Section 21081.6 further requires that: the public agency shall adopt a reporting or monitoring program for the changes made to the project or conditions of project approval, adopted in order to mitigate or avoid significant effects on the environment. The reporting or monitoring program shall be designed to ensure compliance during project implementation.

- The monitoring program must be adopted when a public agency makes its findings under CEQA so that the program can be made a condition of project approval in order to mitigate significant effects on the environment. The program must be designed to ensure compliance with mitigation measures during project implementation to mitigate or avoid significant environmental effects.

NEPA 40 CFR Sections 1502.14f, 1502.16h, and 1505.2c require the following:

- Agencies shall include appropriate mitigation measures not already included in the proposed action or alternatives.

- An Environmental Impact Statement must include a discussion of the means to mitigate adverse environmental impacts.

- The Record of Decision must state whether all applicable means to avoid or minimize environmental harm from the alternative selected have been adopted, and if not, why they were not. A monitoring and enforcement program shall be adopted and summarized where applicable for any mitigation.

Chapter Format

Section 2.1 Compliance with Existing Programs

This section presents the applicable federal, state, regional, county, and local policies and regulations that which the Project must comply. Procedures for compliance with these policies and regulations are presented in the *Permitting Report* (Harland Bartholomew & Associates Inc. 1995). Compliance with these policies and regulations will result in avoidance and/or minimization of adverse environmental impacts.

Section 2.2 Measures Included in the Project

This section presents a listing and description of measures and standards which have been incorporated into the Project Description. The City has adopted these measures and incorporated them as part of the Project in order to avoid or minimize potential environmental impacts. These measures represent standard engineering, design, construction, and maintenance practices. The process for the development of these measures began during the scoping and early planning phase of the Project. Measures were developed to change the Project and avoid potential impacts identified by the public and federal, state, and local agencies. Other measures were developed as a result of geotechnical, biological, cultural, and hydrological surveys in order to avoid or minimize potential impacts.

Because these measures are part of the Project, they do not fit under the normal definition of mitigation. However, these measures have been included in this chapter to provide a mechanism to ensure that these measures are implemented and monitored, and to assist the reader in understanding the commitments made by the City of Santa Rosa.

Section 2.2 includes measures to be implemented in all phases of the Project, including planning and design, construction, and system operation and maintenance. Compliance with these measures will result in avoidance and/or minimization of adverse environmental impacts.

Section 2.3 Planning Measures

This section contains mitigation measures to be implemented during the final planning and detailed design of the Project. These measures often require the refinement of the final Project

design to accommodate particular environmental constraints. Compliance with these mitigation measures would result in avoidance and/or minimization of adverse environmental impacts.

Mitigation measures listed in Sections 2.3, 2.4, and 2.5 are recommended by the consultant team to avoid or reduce environmental impacts. As described above under Legal Basis, the City is required to mitigate impacts whenever it is feasible. Mitigation measures will be adopted by the City at the time of Project approval. At that time, the City has the option of approving alternate mitigation measures, if they can be shown to be effectual and feasible.

Section 2.4 Construction Measures

This section contains mitigation measures to be implemented prior to, during, and immediately following Project construction. These measures generally require the construction manager to follow certain constraints during construction and to repair and rehabilitate impacts resulting from construction of the Project. Compliance with these mitigation measures would result in minimizing, rectifying, or reducing adverse environmental impacts.

Section 2.5 Operation and Maintenance Measures

This section contains mitigation measures to be implemented during operation of the Project. These measures generally require monitoring of system operations over time and the modification of those operations to reduce adverse environmental impacts. Compliance with these measure would result in the reduction of adverse environmental impacts.

Section 2.6 Summary of Mitigation Measures by Alternative

This section provides a summary of all mitigation measures and which alternatives they apply to.

Mitigation Measure Format

Table 2.0-1 presents the format for each mitigation measure and the information that each measure will contain.

Program Implementation and Monitoring

Implementation

The Santa Rosa Utilities Department shall be responsible for overall implementation and administration of the Mitigation and Monitoring Program for the Project. The Utilities Department shall designate a staff person to serve as coordinator of all mitigation monitoring among the various government agencies, construction contractors, and interested residents. This person (Coordinator) will oversee all mitigation measures and ensure they are completed to the standards specified in the EIR/EIS. The Coordinator will also ensure that the mitigation measures are completed in a timely manner and be responsible for the Mitigation Monitoring Checklist (see Table 2.0-3).

Duties of the Coordinator include the following:

- Coordinate with applicable agencies that have mitigation monitoring and reporting responsibility;
- Coordinate activities with the construction manager;

- Coordinate activities of all in-field monitors;
- Develop work plan and schedule for monitoring activities;
- Coordination of activities of consultants hired by the Utilities Department when such expertise and qualifications are necessary;
- Routine inspections and reporting activities;
- Plan checks;
- Assure follow-up and response to citizen inquiries and complaints;
- Develop, maintain, and compile Verification Report form(s);
- Maintain the Mitigation Monitoring Checklist or other suitable mitigation compliance summary; and
- Coordinate and assure implementation of corrective actions or enforcement measures, as needed.

Table 2.0-1

Mitigation Measure Format

2.X.X Mitigation Measure Title

This is the number and title of the mitigation measure. This is the only portion of the measure that is also presented in Chapter 4, Affected Environment and Environmental Consequences. In Chapter 4, the mitigation number and title are cited after the analysis discussion of each impact.

Description: Brief description of the Mitigation Measure.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
A list of impacts, by number and text, to which the mitigation measure applies. *This list directly corresponds to the impact numbers and impact statements presented in Chapter 4.*	The level to which the impact is anticipated to be mitigated. *Generally listed as Less than Significant or Significant*

The Impacts Mitigated and discussion of Level of Significance After Mitigation are not included for Section 2.2 measures because they are part of the Project.

Alternative/Component:	The alternatives or components for which this measure is recommended.
Lead Agency:	The agency or individual that has the responsibility for insuring that the measure is carried out.
Implementing Agency:	The agency or individual that has the responsibility for implementing or performing the measure.
Timing:	**Start:** The appropriate time at which the measure is to be implemented.

Complete: The appropriate time at which the measure is to be complete.

Monitoring Agency: The public agency that has the responsibility for monitoring to insure that the mitigation measure is effective in mitigating the impact.

Validation: The means by which the monitoring agency will verify that the measure has been carried out.

Mitigation Monitoring

The implementation of mitigation measures shall be monitored at two levels. The first level of monitoring is done through the use of a Verification Report. A sample Report is shown as Table 2.0-2. This report is to be completed for each mitigation measure by the in-field monitor, responsible agency, or construction manager (whichever is appropriate for the given action and mitigation measure). Frequency of report completion will vary based on the type of mitigation measure. For example, measures that require modification of final design drawings will only require that the Verification Report be completed at the time the Final drawings are completed and again when they are approved. However, in-field monitoring for activities such as pipeline construction through a stream may require that a Verification Report be completed daily.

Once a mitigation measure has been completed and the measure needs no further monitoring or follow-up, the in-field monitor, responsible agency, or construction manager shall notify the Coordinator that the measure has been completed. This notification shall be done by sending a final Verification Report along with evidence that the measure has been completed, such as final engineering drawing or a photograph of field activities. The Coordinator shall be responsible for collecting and maintaining completed Verification Reports. Copies of these Reports shall be maintained at the Utilities Department.

If the in-field monitor, responsible agency, or construction manager determines that non-compliance has occurred, a written notice shall be delivered to the Coordinator describing the non-compliance and requiring compliance within a specified period of time. If non-compliance still exists at the expiration of the specified period of time, construction may be halted and fines may be imposed upon the party responsible for implementation, at the discretion of the Utilities Department.

The second level of monitoring shall be done through the completion of the Mitigation Monitoring Checklist, Table 2.0-3. The purpose of the Checklist is to provide a summary of the status of all adopted mitigation measures for the Utilities Department, other public officials, and concerned citizens. The Coordinator shall update the Checklist quarterly (four times a year). The Coordinator shall update the Checklist by reviewing all of the Verification Reports and contacting all of the in-field monitors, responsible agencies, and the construction manager to review the status of their respective mitigation measures. A copy of the most current Mitigation Monitoring Checklist shall be maintained at the Utilities Department.

Mitigation Monitoring Status Reporting

The Utilities Department shall compile a Mitigation Monitoring Status Report on an annual basis. The report shall be prepared by the Coordinator and contain the following:

- Mitigation Monitoring Checklist to provide the status of every mitigation measure;

- List of all completed mitigation measures;
- List of all non-compliance incidences, with action taken or required;
- Evaluation of Irrigation Conservation and Management Programs;
- Evaluation of the effectiveness of the mitigation measures;
- Recommendations for modifications to the Mitigation and Monitoring Program to improve effectiveness; and
- Required modifications to the Mitigation and Monitoring Program to comply with legislation and policies adopted in the previous year (e.g. newly listed threatened species).

The Report shall be presented and discussed at a meeting of the Board of Utilities. The meeting shall be noticed in local newspapers and shall be open to the public. The meeting shall be open for the public to speak and present written evidence as to the effectiveness of mitigation measures. It is recommended that the meeting be held in October so that effectiveness of Irrigation Conservation and Management Programs can be evaluated and changes can be made and implemented in advance of the next irrigation season.

Table 2.0-2

Verification Report

Date: ____________ Compliance: ☐ Acceptable ☐ Unacceptable

Location: ______________________________

____

____

Construction Sheet No: ____________

Mitigation Measure: ____________

Discipline:

☐ Land Use/Agriculture ☐ Public Health/Services
☐ Geology ☐ Noise/Air
☐ Water ☐ Transportation
☐ Biology ☐ Cultural/Paleontol.

Activity: ______________________________

Observations: ______________________________

Recommendations: ______________________________

By: ____________ Approved By: ____________

Copies to: ____________ ____________

Anticipated Completion Date: ____________

Method of Compliance: ______________________________

Date Closed: ____________ Authorized By: ____________

Table 2.0-3

Mitigation Monitoring Checklist

Mitigation Measure	Implementing Agency	Monitoring Agency	Status	Comments
2.2 Measures Included in the Project				
2.2.1 Irrigation Conservation and Management Programs	City of Santa Rosa	City of Santa Rosa		
2.2.2 Irrigation Site Resource Maps	City of Santa Rosa	City of Santa Rosa		
2.2.3 Restrict Surface and Subsurface Irrigation Water Runoff	Individual Irrigators/City of Santa Rosa	City of Santa Rosa		
2.2.4 Restrict Soil Erosion and Sediment Movement	Individual Irrigators/City of Santa Rosa	City of Santa Rosa		
2.2.5 Avoid Sensitive Biological Resources	Individual Irrigators/City of Santa Rosa	City of Santa Rosa		
2.2.6 Agrochemical and Fertilizer Best Management Practices	City of Santa Rosa	City of Santa Rosa		
2.2.7 Prohibit Creation of Mosquito Habitat	Individual Irrigators	City of Santa Rosa/Marin Sonoma Mosquito Abatement District		
2.2.8 Revegetate Temporarily Disturbed Sites	City of Santa Rosa/Construction Manager	City of Santa Rosa/Corps		
2.2.9 Retain Stripped Topsoil	Construction Manager	City of Santa Rosa		
2.2.10 Storm Water Pollution Prevention Plan	City of Santa Rosa	RWQCB		
2.2.11 Protect Creeks from Toxic Discharge	Construction Manager	City of Santa Rosa		
2.2.12 Concrete Waste Management	Construction Manager	City of Santa Rosa/CDFG		
2.2.13 Pipeline Features in Active Fault Zones	City of Santa Rosa	City of Santa Rosa		

Table 2.0-3

Mitigation Monitoring Checklist

Mitigation Measure	Implementing Agency	Monitoring Agency	Status	Comments
2.2.14 Dam Safety	City of Santa Rosa	Office of Emergency Services		
2.2.15 Standard Traffic Control Procedures	City of Santa Rosa	City of Santa Rosa		
2.2.16 Emergency Response Vehicles Will Not be Impeded	City of Santa Rosa	City of Santa Rosa		
2.2.17 Maintain Maximum Number of Open Lanes on Roadways	City of Santa Rosa	City of Santa Rosa		
2.2.18 Jack and Bore Construction at Major Highways	City of Santa Rosa	City of Santa Rosa		
2.2.19 Fence or Cover Trenches	City of Santa Rosa/Construction Manager	City of Santa Rosa		
2.2.20 Access to Businesses and Residences	City of Santa Rosa/Construction Manager	City of Santa Rosa		
2.2.21 Repair Road Damage	City of Santa Rosa	City of Santa Rosa		
2.2.22 Park Within Construction Easements	City of Santa Rosa/Construction Manager	City of Santa Rosa		
2.2.23 Limit Delivery Hours	Construction Manager	City of Santa Rosa		
2.2.24 Limit Ingress/Egress of Construction Equipment	Construction Manager	City of Santa Rosa		
2.2.25 Minimize/Reduce Fossil Fuel Consumption	Construction Manager	City of Santa Rosa		
2.2.26 Odor Control for Sludge Handling	Laguna Treatment Plant Operators	City of Santa Rosa		

Table 2.0-3

Mitigation Monitoring Checklist

Mitigation Measure	Implementing Agency	Monitoring Agency	Status	Comments
2.2.27 Uniform Relocation Assistance	City of Santa Rosa	City of Santa Rosa		
2.3 Planning Measures				
2.3.1 Replacement of Open Space Easements	City of Santa Rosa	City of Santa Rosa/Sonoma County Agriculture Preservation and Open Space District		
2.3.2 Restrict Approval of Agricultural Irrigation Contracts	City of Santa Rosa	City of Santa Rosa		
2.3.3 Agricultural Irrigation Demonstration Programs	City of Santa Rosa	City of Santa Rosa		
2.3.4 Slope Stabilization Design	City of Santa Rosa	City of Santa Rosa/Division of Safety of Dams		
2.3.5 Liquefaction Stabilization Design	City of Santa Rosa	City of Santa Rosa		
2.3.6 Standard Engineering Methods for Corrosive Soils	City of Santa Rosa	City of Santa Rosa		
2.3.7 Slope Monitoring and Response System	City of Santa Rosa	City of Santa Rosa		
2.3.8 Earthquake Preparedness and Emergency Response Program	City of Santa Rosa	City of Santa Rosa		
2.3.9 Adjust Pipeline Alignments	City of Santa Rosa	City of Santa Rosa		
2.3.10 Limit Construction Disturbance	City of Santa Rosa	City of Santa Rosa		
2.3.11 Sensitive Resource Conservation Program	City of Santa Rosa	City of Santa Rosa/ CDFG/USFWS/ Corps		
2.3.12 Provide Replacement Water Supply for Affected Wells	City of Santa Rosa	City of Santa Rosa		

Table 2.0-3

Mitigation Monitoring Checklist

Mitigation Measure	Implementing Agency	Monitoring Agency	Status	Comments
2.3.13 Monitor Groundwater Levels	City of Santa Rosa	City of Santa Rosa		
2.3.14 Update Existing Hazardous Materials Management Plan	City of Santa Rosa	City of Santa Rosa Fire Department		
2.3.15 Construction Management Program	City of Santa Rosa/Construction Manager	City of Santa Rosa/Cal-OSHA		
2.3.16 Mosquito Prevention Program	City of Santa Rosa	City of Santa Rosa/Marin-Sonoma Mosquito Abatement District		
2.3.17 Pump Station Noise Control	Qualified Noise Engineer/City of Santa Rosa	City of Santa Rosa		
2.3.18 Identification and Evaluation of Cultural Resources	City of Santa Rosa	City of Santa Rosa/Corps/State Historic Preservation Officer		
2.4 Construction Measures				
2.4.1 Removal of Aggregate Resources Prior to Construction	City of Santa Rosa/Construction Manager	City of Santa Rosa		
2.4.2 Remove Weak Surficial Deposits from Reservoir Footprint	Construction Manager	City of Santa Rosa		
2.4.3 Standard Engineering Methods for Expansive Soils	Construction Manager	City of Santa Rosa		
2.4.4 California Red-legged Frog Capture and Relocation Program	City of Santa Rosa	City of Santa Rosa		

Table 2.0-3

Mitigation Monitoring Checklist

Mitigation Measure	Implementing Agency	Monitoring Agency	Status	Comments
2.4.5 Active Raptor Nest Location and Monitoring Program	City of Santa Rosa	City of Santa Rosa/CDFG		
2.4.6 Screen Concrete Diversion Channels, Pump Stations And Other Facilities	Construction Manger	City of Santa Rosa		
2.4.7 Establish Tree Screening	City of Santa Rosa	City of Santa Rosa		
2.4.8 Revegetate Face of the Reservoir Dam	Construction Manager	City of Santa Rosa		
2.4.9 Construction Noise Control Measures	City of Santa Rosa/Construction Manager	City of Santa Rosa		
2.4.10 Vehicle and Equipment Exhaust Control Program	City of Santa Rosa	City of Santa Rosa		
2.4.11 Dust Control Program	City of Santa Rosa	City of Santa Rosa/AQMD or APCD		
2.4.12 Protect Undiscovered Cultural Resource Sites	City of Santa Rosa	City of Santa Rosa/Corps/State Historic Preservation Officer		
2.4.13 Protect Vertebrate Paleontologic Resources	Project Paleontologist	City of Santa Rosa		
2.4.14 Coordinate Alternative Fire Response Service	City of Santa Rosa/Construction Manager	City of Santa Rosa		
2.4.15 Sensitive Plant Relocation Program	City of Santa Rosa	City of Santa Rosa		
2.4.16 Ecological Risk Monitoring and Source Control Program	City of Santa Rosa	City of Santa Rosa		

Table 2.0-3

Mitigation Monitoring Checklist

Mitigation Measure	Implementing Agency	Monitoring Agency	Status	Comments
2.5 Operation and Maintenance Measures				
2.5.1 Pesticides Control Program	City of Santa Rosa	City of Santa Rosa/RWQCB		
2.5.2 Control Program for Dissolved Copper Levels	City of Santa Rosa	City of Santa Rosa/RWQCB		
2.5.3 Control Program for Hydrogen Sulfide, Ammonia, and Dissolved Oxygen	City of Santa Rosa	City of Santa Rosa/RWQCB		
2.5.4 Discharge Operations	City of Santa Rosa	City of Santa Rosa/RWQCB		
2.5.5 Cyanide Monitoring and Source Control Program	City of Santa Rosa	City of Santa Rosa/RWQCB		
2.5.6 Total and Ammonia Nitrogen Source Control Program	City of Santa Rosa	City of Santa Rosa/RWQCB		
2.5.7 Toxicity Control Program	City of Santa Rosa	City of Santa Rosa/RWQCB		
2.5.8 Monitor Seismic Events and Adjust Injection Rate	City of Santa Rosa	City of Santa Rosa		
2.5.9 Implement Septic System Monitoring Program	City of Santa Rosa	City of Santa Rosa/Sonoma County Environmental Health Department		
2.5.10 Discharge Prohibition During Flood Stage	City of Santa Rosa	City of Santa Rosa		

Source: Harland Bartholomew & Associates Inc., 1996

Notes:
1. APCD: Air Pollution Control District

2. AQMD: Air Quality Management District
3. Cal-OSHA: California Office of Safety and Health Administration
4. CDFG: California Department of Fish and Game
5. Corps: U.S. Army Corps of Engineers
6. RWQCB: Regional Water Quality Control Board
7. USFWS: U.S. Fish and Wildlife Service

2.1 COMPLIANCE WITH EXISTING PROGRAMS

This section presents the applicable federal, state, regional, county, and local policies and regulations that the Project components are required to comply with. Procedures for compliance with these policies and regulations are presented in the *Permitting Report* (Harland Bartholomew & Associates, Inc. 1995). Compliance with these policies and regulations will result in avoidance and/or minimization of adverse environmental impacts.

2.1.1 Federal

Archaeological and Historic Data Preservation Act of 1974

Federal Water pollution Control Act, as amended by the Clean Water Act of 1977; Section 404

Coastal Zone Management Act of 1972

Code of Federal Regulations, Title 40 Parts 6, 51, and 93

Federal Antiquities Act of 1906

Federal Clean Air Act of 1970, amended 1977 and 1990

Federal Endangered Species Act of 1973, as amended

Mining Law of 1872, amended 1988

National Environmental Policy Act of 1969

National Historic Preservation Act of 1972, Sections 106 and 110

Marine Protection, Research, and Sanctuaries Act of 1972

National Natural Landmarks Program, Historic Sites Act of 1935

Rivers and Harbors Act of 1899, Section 10

Surface Mining Control and Reclamation Act of 1977

2.1.2 State

California Environmental Quality Act

California Endangered Species Act

California Clean Air Act

California Occupational Safety and Health Administration (Cal-OSHA)

California Department of Fish and Game Stream Bed Alteration Agreement (Fish and Game Code Section 1601-1603)

California Department of Fish and Game Wildlife/Hardwood Management Guidelines (Revised 1994)

California Division of Safety of Dams Permit

California Health and Safety Code, Section 25500 et seq. - Hazardous Materials Release Response Plans and Inventory

Native Plant Protection Act (Fish and Game Code Section 1900-1913)

Public Resources Code, Sections 5097.5 and 30244

Public Resources Code, Sections 5020-5024 (California Register of Historic Places)

Title 8, California Code of Regulations, Section 1539 - 1541.1 - Excavations

Title 8, California Code of Regulations, Sections 1539 - 1541.1 - Excavations

Title 8, California Code of Regulations, Sections 1509 & 3203 - Injury and Illness Prevention Program

Title 8, California Code of Regulations, Sections 1597 - 1599 - Vehicles, Traffic Control, Flaggers, Barricades, and Warning Signs

Title 8, California Code of Regulations, Section 5194 - Hazard Communication

Title 22, California Code of Regulations, Section 60301 et seq. - Reclaimed Water

Title 22, California Code of Regulations, Section 66260.1 et seq. - California Hazardous Waste Regulations

2.1.3 Regional

Bay Area Clean Air Plan

Bay Area Air Quality Management District Risk Management Policy

Bay Area Air Quality Management District Rules and Regulations

Northern Sonoma Air Pollution Control District Rules and Regulations

North Coast Regional Water Quality Control Board

Basin Plan

Wastewater Discharge Requirements

Stormwater Pollution Prevention Plan (construction sites)

San Francisco Bay Regional Water Quality Control Board

Basin Plan

Waste Discharge Requirements

2.1.4 County and City

Sonoma County

Sonoma County Aggregate Resource Management Plan

Sonoma County Coastal Plan

Sonoma County General Plan

Planning Areas - Countywide, Cloverdale/N.E. County Planning Area, Healdsburg and Environs, Santa Rosa and Environs, Rohnert Park - Cotati and Environs, Petaluma and Environs

Sonoma County Tree Ordinance (No. 4014)

Sonoma County Zoning Ordinance

Building Codes

Marin County

Marin County Countywide Plan

Marin County Local Coastal Program

Marin County Zoning Ordinance

Building Codes

City of Santa Rosa

Building and Grading Regulations

Santa Rosa City Code: Historic and Cultural Preservation

Santa Rosa General Plan

Santa Rosa Zoning Ordinance

City of Sebastopol

Building and Grading Regulations

Sebastopol General Plan

Sebastopol Zoning Ordinance

City of Petaluma

Building and Grading Regulations

Petaluma General Plan

Petaluma Zoning Ordinance

2.2 MEASURES INCLUDED IN THE PROJECT

This section presents a listing and description of measures and standards which have been incorporated into the Project Description. The City has adopted these measures and incorporated them as part of the Project in order to avoid or minimize potential environmental impacts. These measures represent standard engineering, design, construction, and maintenance practices that were identified during the preliminary planning and scoping phases of the Project. The process for the development of these measures began during the scoping and early planning phase of the Project. Measures were developed to change the Project and avoid potential impacts identified by the public and federal, state, and local agencies. Other measures were developed as a result of geotechnical, biological, cultural, and hydrological surveys in order to avoid or minimize potential impacts.

Because these measures are part of the Project Description, they do not fit under the normal definition of mitigation. However, these measures have been included in this Chapter to provide a mechanism to ensure that these measures are implemented and to assist the reader in understanding the commitments made by the City of Santa Rosa.

Section 2.2 includes measures to be implemented in all phases of the Project, including planning and design, construction, and system operation and maintenance. Compliance with these measures will result in avoidance and/or minimization of adverse environmental impacts.

2.2.1 Irrigation Conservation and Management Programs

Description:

The City of Santa Rosa will control the application of reclaimed water for agricultural uses and the types of agricultural lands eligible to receive reclaimed water through individual Irrigation Conservation and Management Programs (ICMPs). ICMPs will be prepared and implemented for every new agricultural irrigation site. The reclaimed water contracts between the City and the landowners shall require a commitment from the landowners to implement the ICMPs.

Each ICMP will contain measures which control the application of irrigation water and integrate irrigation with other resource management needs. At a minimum, the individual Irrigation Conservation and Management Programs prepared by the City of Santa Rosa will incorporate procedures and restrictions presented in Mitigation Measures 2.2.2 through 2.2.7. Other guidelines for the development of individual Irrigation Conservation and Management Programs are provided in *the Irrigation Management Guidelines* Technical Memorandum (Questa 1996).

Alternative/Component: All Agricultural Irrigation Components

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing:

Start: ICMPs will be developed prior to the delivery of reclaimed water to any parcel.

Complete: ICMPs will be updated annually, until the landowner no longer utilizes reclaimed water.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation:

Contracts between landowners and the City will require conformance to the ICMP. The City will maintain a copy of the current ICMP in their files. ICMPs will be reviewed annually for determination of compliance with the Long-term Wastewater Project Mitigation and Monitoring Program.

2.2.2 Irrigation Site Resource Maps

Description:

The City will utilize Irrigation Site Resource Maps to delineate soil constraints and sensitive areas such as wetlands, stream corridors, erosive soils, and gullied lands. During design of the agricultural irrigation system, the City of Santa Rosa will update the resource map for each irrigation site (mapping will be restricted to the potential irrigation site and 100 feet beyond). These maps will be developed by verifying and updating, as necessary, previous biological, natural resource, and soil studies. Where irrigation sites have not had biological, natural resource, and soil studies, such studies will be conducted in conformance with State and Federal protocols. Resources to be verified and the required resource specialist are shown in the table below. These resource maps will serve as the foundation of each Irrigation Conservation and Management Program.

Resource	Resource Expert
Soils	Certified professional soil scientist
Wetlands	Qualified wetlands scientist
Botanical resources	Qualified botanist
Wildlife Resources	Qualified wildlife biologist
Trees	Certified arborist
Other	**Advisors**
Agricultural Cultivation Practices	Agronomist
Irrigation	Agricultural Engineer
Fertilizer/Pesticide Application Practices	Agronomist/Pest Control Advisor

Alternative/Component: Agricultural Irrigation Components

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: City of Santa Rosa Utilities Department

Timing: **Start:** During design of the agricultural irrigation system.

Complete: Resource maps will be completed prior to completion of ICMPs.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City will maintain a copy of the current resource map in their files. Copies of the resource map will also be contained in the individual Irrigation Conservation and Management Program.

2.2.3 Restrict Surface and Subsurface Irrigation Water Runoff

Description:

The City of Santa Rosa will require that lands irrigated with reclaimed water are managed such that surface runoff of reclaimed water to adjacent waterways does not occur; and so that the percolation of applied reclaimed water through the root zone is minimized (as defined below). To obtain the surface and subsurface water runoff performance criteria, the following Best Management Practices are recommended for inclusion in the ICMP:

Use sprinkler or drip irrigation methods. Follow sprinkler irrigation and drip irrigation design criteria provided in Section 4.4 of the Irrigation Management Guidelines. These criteria establish that for sprinkler irrigation, the design rate of application will be within a range established by the minimum practical application rate under local climatic conditions and the maximum rate consistent with the intake rate of the soil and the individual parcel's ICMP. For drip irrigation the design rate of application will be within a range established by the minimum practical discharge rate of the applicators (orifices, emitters, perforated pipe) and the maximum rate consistent with the intake rate of the soil and the individual parcel's program.

In the West County, practice deficit irrigation management on all drought tolerant crops. Deficit irrigation management is a method by which excess water from irrigation lost to runoff and subflow is reduced. Methods that may be used are: 1) increasing uniformity through good design; and 2) reducing irrigation applications (essentially under- irrigating). Drought tolerant crops include many of the hay, forage and pasture grasses.

In the South County, practice high efficiency irrigation management on all drought intolerant crops, such as lettuce and strawberries. High efficiency irrigation management methods include scheduling irrigation and operating the irrigation system to minimize runoff and deep percolation losses. Scheduling is generally accomplished using real-time weather data, soil moisture monitoring data, and computer assisted scheduling systems.

Deficit irrigation and high efficiency irrigation management procedures are based on Chapter 17 of *American Society of Agronomy Monograph on Irrigation Management* and *United Nations Food and Agriculture Organization Irrigation and Drainage Paper No. 33.*

Other Best Management Practices which may be implemented to ensure the surface and subsurface water runoff performance criteria are met include the following:

> Existing very poorly drained areas and areas with shallow restrictive layers may be considered unsuitable for irrigation.
>
> Over-irrigation, or application of irrigation water in excess of crop consumptive water demand may not be allowed, except on Reyes soils.

Water levels in fields may be closely monitored by the irrigator and irrigation scheduling adjusted accordingly.

Where monitoring indicates that drainage problems are developing, occasional summer fallowing (growing a dry-land hay crop, or crop with greatly reduced irrigation application) of problem parcels may be implemented.

Small scale drainage improvements (ditches and the drain systems) may be considered for portions of fields where the above management practices are insufficient to preclude localized development of drainage problems (wetlands are excluded).

Landowners with parcels comprised of Reyes soils may over-irrigate to maintain a high water content and anoxic conditions in the subsoils. Landowners would ensure that surface ponding is avoided for purposes of mosquito control. Drainage ditches will also be closely monitored for mosquito control.

Landowners with parcels comprised of Reyes soils may apply lime to the soil to increase the pH. The lime application frequency would be established in the Irrigation Conservation and Management Program.

Alternative/Component: All Agricultural Irrigation Components

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: Individual Irrigators/City of Santa Rosa Utilities Department

Timing: **Start:** During design of the agricultural irrigation system.

Complete: Throughout the life of the Project or until the landowner no longer utilizes reclaimed water for irrigation.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: To ensure that the listed Best Management Practices are successful in restricting surface runoff and subsurface flow, as stated in the performance criteria, the City will continuously monitor and record the volume of water delivered to each reclaimed water user and calculate the application rate. The City of Santa Rosa will also monitor evaporation and calculate evapotranspiration in each irrigation region. By monitoring these factors the City will be able to compare irrigation application rates and evapotranspiration to verify that the application of reclaimed water is being managed in accordance with the Irrigation Conservation and Management Program for each irrigation site. In addition, the City will establish continuous streamflow recording gauges at key watershed locations to characterize flow.

The City of Santa Rosa will develop a standard monitoring form/checklist for use by individual irrigators and the City will require that irrigators monitor all locations of potential runoff from sites daily to determine if surface runoff is resulting in overflow of the control facilities. The City will conduct spot checks of irrigators on at least a weekly basis to ensure that daily monitoring is occurring.

If monitoring data indicate that the performance criteria are not being met, the City will adjust application rates and implement additional Best Management Practices (from the list above). If none of the Best Management Practices are effective in restricting surface and subsurface irrigation water runoff, the City will cease delivery of project water.

All Best Management Practices to be implemented to meet the surface and subsurface water runoff performance criteria will be listed in the ICMP. Monitoring logs will be maintained of each site visit and findings will be summarized in an annual monitoring report, along with management recommendations.

2.2.4 Restrict Soil Erosion and Sediment Movement (Irrigation Sites)

Description:

The City of Santa Rosa will require lands irrigated with reclaimed water be managed so that no net increase in sediment movement or soil erosion occurs over existing conditions. To ensure the sediment movement and soil erosion performance criteria are met, the City will implement the following Best Management Practices (unless expert opinion and studies indicate probable compliance with the performance criteria):

The City of Santa Rosa will place restrictions on the kinds of crops that can be grown using project reclaimed water, based on slope, to minimize the potential for soil erosion and sediment movement. These restrictions are:

> Slopes 0-5%: Eligible for reclaimed water with no crop choice restrictions or restrictions on urban irrigation application.
>
> Slopes 6-9%: Eligible for reclaimed water to grow irrigated hay, forage, and silage crops; orchards and vineyards (with cover crops); and permanent pasture. No restrictions on urban irrigation application.
>
> Slopes 10-15%: Eligible for reclaimed water to grow permanent irrigated pasture and orchards and vineyards (sprinkler irrigation and establishment and maintenance of a permanent cover crop required). No restrictions on urban irrigation application.
>
> Slopes 16%+: Ineligible for reclaimed water except for small areas within an existing area of flatter slopes.

Where sediment has the potential to reach a stream or other body, the City of Santa Rosa will implement filter strips in accordance with design criteria and procedures outlined in US Department of Agriculture Conservation Reserve Program. Filter strips consist of strips of land located alongside stream courses or water bodies that are designed to passively filter sediment, nutrients and pesticides from runoff water.

For irrigated pastures on slopes ranging from 10 % to 15 %, the Irrigation Conservation and Management Program will include a pasture management plan that may provide for, but not be limited to, cross-fencing to provide for post-irrigation dry-down period, proper stocking rates and grazing periods, maintenance of correct amount of plant residue, and rest-rotation or other similar management. Rest-rotation management requires that animals are regularly rotated through fields allowing a period when pastures are irrigated, dried down and regrown (rested) between grazing.

Alternative/Component: All Agricultural Irrigation Components

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: Individual Irrigators/City of Santa Rosa Utilities Department

Timing: **Start:** The City of Santa Rosa will implement slope restrictions during design of the irrigation system.

Complete: Throughout the life of the Project or until the landowner no longer utilizes reclaimed water for irrigation.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City of Santa Rosa will monitor the success of the Best Management Practices in meeting the sediment movement and soil erosion performance criteria through visual inspection of irrigated fields, and collection, analysis and comparison of suspended sediment in rainfall runoff samples.

Individual irrigators will conduct a daily visual inspection of irrigated fields to check for evidence of accelerated erosion and excessive surface sediment transport to receiving waters.

The City of Santa Rosa will conduct a paired analysis and comparison of rainfall runoff from representative irrigation and non-irrigation sites to determine if the suspended solids content in irrigation runoff is comparable to non-irrigation runoff. The City will conduct the rainwater runoff analysis after every rainfall event during the irrigation season (which would be expected to be infrequent, with little or no runoff) and after the first two rainfall events of the winter rainy season. The City of Santa Rosa will also perform monthly, visual spot checks of irrigation parcels.

If monitoring data indicates that the sediment movement criteria performance criteria are not being met, the City of Santa Rosa will adjust irrigation application rates and implement additional Best Management Practices (from Measure 2.2.3). If none of the measures are effective in restricting sediment movement, the City will cease delivery of project water.

All Best Management Practices to be implemented to meet the sediment movement performance criteria will be listed in the ICMP. Monitoring logs will be maintained of each site visit and findings will be summarized in the annual monitoring report.

2.2.5 Avoid Sensitive Biological Resources (Irrigation Areas, Pipelines, Pump Stations, and Electrical Support Systems)

Description:

The City of Santa Rosa will avoid impacts to sensitive biological resources in the design, construction, operation and maintenance of new irrigation areas, pipelines, pump stations, geysers storage tanks, access roads, and equipment staging areas.

Sensitive biological resources are defined as:

Jurisdictional waters of the U.S. including wetlands, streams, creeks and channels;

Plants and animals that are legally protected, proposed, or candidates for protection under the California Endangered Species Act (CESA) and Federal Endangered Species Act (FESA);

Animals designated as "species of special concern" by the California Department of Fish and Game ;

Animals listed as "fully protected" in the Fish and Game Code of California (Sections 3511, 4700, 5050, and 5515);

Plants listed in the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* (CNPS 1994) Lists 1b-4;

Sensitive Plant Communities as identified by the California Department of Fish and Game in the California Natural Diversity Data Base (Department of Fish and Game);

Protected trees as defined in the Sonoma County and Marin County tree ordinances; and

Raptor nests, as protected in Fish and Game Code of California (Section 3503.5).

The City of Santa Rosa will retain a qualified biologist to conduct pre-construction biological surveys prior to the project-level siting of pipelines, pump stations, geysers storage tanks, and equipment staging areas. For irrigation areas, these surveys will be conducted as part of the resource map development (Measure 2.2.2, Irrigation Site Resource Maps). The purpose of these surveys will be to identify and map the above sensitive resources within and 100 feet adjacent to proposed construction zones. Potential raptor nest trees within 0.25 miles of the irrigation areas or construction zone will be visually surveyed with binoculars to determine occupancy during the nesting season prior to construction.

The following measures will be implemented during design, construction and operation of the proposed Project to avoid impacts to sensitive biological resources:

Irrigation Areas

The City will meet the following irrigation-related setbacks and buffer objectives. These objectives may be altered if future studies conducted by the City should verify that lesser buffer widths are adequate to avoid impacts:

> A minimum 50-foot setback from irrigation application and a minimum 30-foot setback from new cultivation and construction around any identified sensitive plant species habitat.
>
> No activity within the dripline of protected trees.
>
> A minimum 30-foot setback from construction, new cultivation or irrigation application from jurisdictional wetland boundaries or the top of the bank of linear waterways (including isolated wetlands, excluding irrigation ditches and excavated drainages).
>
> A minimum 50-foot setback from irrigation application and new cultivation around the upland riparian corridor (outer most dripline) of all linear waterways, including streams, creeks, and rivers. All linear waterways passing through irrigated pasture lands will be fenced to prevent livestock from accessing the stream corridor.
>
> A minimum 100-foot setback from the edge of upland riparian corridors from construction and cultivation.
>
> A minimum 500-foot setback from irrigation application, new cultivation, or construction around all known breeding sites of state of federally listed, proposed or candidate avian or amphibian species.
>
> A minimum 500-foot setback from irrigation application, new cultivation, or construction around all known dens of state of federally listed, proposed or candidate mammalian species (none are currently identified in the Project area).

Restoration procedures for gullied lands, irrigation ditches, and excavated drainages. These procedures may include, but not be limited to: fencing (10-foot setback fence) and stabilization/restoration, such as installing check dams and willow cuttings.

Pipelines, Pump Stations, Geysers Storage Tanks, and Staging Areas Design

The pipelines, pump stations, geysers storage tanks, and staging areas will be sighted to avoid impacts to sensitive resources. The following siting criteria will be employed to ensure avoidance of these resources:

The designated construction zone for pipelines, pump stations, geysers storage tanks, and staging areas will be designed to provide an exclusionary buffer from sensitive plant resources (recommend a minimum 30-foot).

The City of Santa Rosa will design pipeline stream crossings that are oriented as close to perpendicular (90 degree angle) as practicable.

Pipeline construction corridors shall be limited to 30 feet from the roadway centerline.

Where potential jurisdictional wetlands and waters of the United States or riparian areas parallel existing roadways and no bridge or culvert structure is crossed, pipeline construction activities shall be confined to within 10 feet of the roadway centerline or the existing road right-of-way or nearby suitable upland location, and shall not be located within wetlands or other sensitive biological resource areas.

Postpone grading of the right-of-way through riparian zones or wetlands until in-stream work is ready to commence.

Limit grading to the minimum area necessary to allow for movement of construction machinery and subsequent ditching and pipe installation operations.

Cut vegetation off at ground level, leaving existing root systems intact.

The City of Santa Rosa will design pipelines that cross perennial streams to be constructed using jack and bore. Additional staging areas would be required for bore and jack crossings. Additional temporary workspace for staging or pad area for bore and jack crossings shall be limited to a maximum 5,000 square foot pipeline construction staging area, typically 50' by 100'. Pads for bore and jack operations and construction staging areas for pump stations and geysers storage tanks shall be located outside of the limits of potential jurisdictional wetlands and other waters of the United States and riparian or native vegetation.

The following stream crossings will use jack and bore (crossings are identified by stream name and approximate location of pipeline crossing):

Big Sulphur Creek - Geysers property
Cobb Creek - Geysers property
Squaw Creek - Geysers property
Anna Belcher Creek (or tributary) - Pine Flat Road
Anna Belcher Creek - Pine Flat Road
Hurley Creek - Pine Flat Road

Little Sulphur Creek - Pine Flat Road
Sausal Creek (1) - Pine Flat Road
Sausal Creek (2) - Highway 128
Maacama Creek - Chalk Hill Road
Franz Creek - Chalk Hill Road
Mark West Creek - Slusser Road
Santa Rosa Creek - Willowside Road
Santa Rosa Creek - Madison Street
Santa Rosa Creek - Olive Street
Spring Creek - Franquette Avenue
Matanzas Creek - Farmers Lane
Matanzas Creek - Hoen Avenue
Mark West Creek - Trenton Healdsburg Road
Mark West Creek - River Road (1)
Mark West Creek - River Road (2)
Atascadero Creek - Green Valley Road
Green Valley Creek - Green Valley Road
Purrington Creek - Graton Road
Atascadero Creek - Occidental Road
Blucher Creek - Gravenstein Highway
Laguna de Santa Rosa - Llano Road
Atascadero Creek - Mills Station Road
Atascadero Creek tributary- Ferguson Road
Atascadero Creek - Bodega Highway
Atascadero Creek - Water Trough Road
Americano Creek - Highway 1
Americano Creek - Marsh Road
Adobe Creek - Adobe Road
Estero Americano - Franklin School Road
Ebabias Creek - Highway 1

Pipelines, Pump Stations, Geysers Storage Tanks, and Staging Areas Construction

The pipelines, pump stations, geysers storage tanks, and staging areas will be constructed to avoid effects to the above sensitive resources. The following construction measures will be employed to ensure avoidance of these resources:

> A mesh fence will be installed at the boundary of exclusionary buffer zones established for sensitive biological resources, with the exception of raptor nest trees.
>
> The construction manager will ensure that vegetation removed in the right of way will be removed in a manner that leaves the edges of the right of way with a feathered and tapered appearance. This vegetation removal method prevents leaving

a construction area with a clear-cut "swath" appearance. Cleared vegetation, tree trimmings, and other plant material are either chipped and composted on-site or taken to a compost processing facility. Plant material will not be: buried, pushed into a creek or stream; left in the roadway; disposed of in trash dumpsters; or mixed with other wastes (except as authorized by an approved compost facility).

Where pipeline construction crosses a seasonal stream, the City of Santa Rosa will regulate timing of construction to ensure that no construction occurs in a live stream. See *Wetland Determination and Mitigation for Proposed Pipeline Alignments* Technical Memorandum (Parsons Engineering Science, Inc. 1996) for additional detail on identified sites. Construction in a seasonal stream will be scheduled during the low flow period generally from June 1 through October 15.

For streams crossed by pipelines using open trench construction, the top layer of the streambed will be stockpiled and preserved during construction. After the pipeline has been installed, the stockpiled material will be placed back in the streambed to minimize the potential for sediment to be suspended when rainfall creates streamflow, and to return the streambed substrate to its original composition.

Construction of a Russian River outfall will be restricted to the low flow period when the water level is below the construction area (generally between June 1 and October 15).

Construction around or involving protected trees will follow standards adopted by the Sonoma County (Tree Protection and Replacement Ordinance), Marin County (Draft Tree Preservation Plan) and the City of Santa Rosa. These ordinances establish standards for "protected" (oaks, madrone, redwood, and California bay) and "protected trees of special significance" (valley oak). These standards are as follows:

Protected trees, their protected perimeters and whether they are to be retained or removed are to be clearly shown on all improvement plans. A note will be placed on the construction plans that 'Construction is subject to requirements established to protect certain trees'.

Before the start of any clearing, excavation, construction or other work on the site, every tree designated for protection on the approved site plan will be clearly delineated with a substantial barrier (steel posts and barbed wire or chain link fencing) at the protected perimeter, or limits established during the permit process. The delineation markers will remain in place for the duration of all work.

Limbing of trees is to be conducted by a certified arborist and only when necessary as a means of protecting the tree from damage or removal.

All trees to be removed will be clearly marked. Where proposed development or other site work must encroach upon the protected perimeter of a protected tree, special measures will be incorporated to avoid compaction and allow the roots to obtain oxygen, water, and nutrients. Tree wells or other techniques may be used where advisable. No changes in existing ground level will occur within the protected perimeter unless a drainage and aeration scheme approved by a certified arborist is utilized. No burning or use of equipment with an open flame will occur near or within the protected perimeter (except for authorized controlled burns).

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: City of Santa Rosa Utilities Department

Timing: **Start:** Design measures. During component design. Construction Measures. At the start of construction. Irrigation buffers will be maintained until the landowner no longer utilizes reclaimed water for irrigation.

Complete: At the completion of construction.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: Irrigation setbacks and buffers will be incorporated into each ICMP during the preparation of each ICMP. The City will review Final Engineering Drawings and ICMPs to verify that appropriate setbacks and buffers have been established to protect sensitive biological resources.

2.2.6 Agrochemical and Fertilizer Best Management Practices

Description:

The City of Santa Rosa will require that individual Irrigation Conservation and Management Programs incorporate State Water Resources Control Board Technical Advisory Committee management recommendations for Irrigated Agriculture and Pesticides to minimize offsite movement of pesticides. These include, but are not limited to, the following:

> Control pollutants at their source through the verification of the need and amount of pesticides and fertilizer through soil and plant tissue testing, utilization of Integrated Pest Management procedures, utilization of the least toxic, least soluble, least persistent agrochemical, and careful evaluation and application of the lowest amount of agrochemical that will achieve the management goal.
>
> Reduce the mobilization of pollutants through control of soil erosion, irrigation runoff, and subflow.
>
> Capture pollutants that are mobilized through the utilization of vegetated filter strips and grassed waterways and the utilization of on-farm sediment detention structures where necessary. Detention structures will be placed outside of buffers for sensitive biological resources.
>
> Utilize, dilute, detoxify, or dispose of excess pollutants correctly through proper handling (mixing and storage) and disposal practices.

The City of Santa Rosa will require that all individual Irrigation Conservation and Management Programs for irrigated pasture lands will have a nutrient and manure management component that takes into account the individual problems and needs for disposal of solids and liquid wastes. This component of the Irrigation Conservation and Management Program will be based on the knowledge and experience gained by the Resource Conservation Districts in part from their 319H Manure Management Implementation Grant from the State Water Resources Control Board.

Alternative/Component: All Agricultural Irrigation Components

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: City of Santa Rosa Utilities Department

Timing:

Start: During development of the ICMPs. The City will conduct spot-checks at least once a month to ensure that landowners are implementing the nutrient and manure management component of the ICMP.

Complete: Throughout the life of the Project or until the landowner no longer utilizes reclaimed water for irrigation.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The nutrient and manure management component of the ICMP will be developed prior to delivery of reclaimed water to any parcel.

2.2.7 Prohibit Creation of Mosquito Habitat

Description:	The City of Santa Rosa will not allow sites irrigated with reclaimed water to have water ponding deeper than one inch for a period greater than four days.
Alternative/Component:	All Urban and Agricultural Irrigation Components
Lead Agency:	City of Santa Rosa Utilities Department
Implementing Agency:	Individual Irrigators
Timing:	**Start:** Individual irrigators will begin monitoring on the first day irrigation is applied. Monitoring will continue on a daily basis throughout the irrigation season. **Complete**: Until the landowner no longer utilizes reclaimed water for irrigation.
Monitoring Agency:	City of Santa Rosa Utilities Department and Marin/Sonoma Mosquito Abatement District
Validation:	All Best Management Practices required to ensure that sites irrigated with reclaimed water do not have water ponding greater than a period of four days will be incorporated into each individual ICMP. The City of Santa Rosa, with assistance from Marin/Sonoma Mosquito Abatement District, will perform spot-checks of sites receiving reclaimed water at least once a week. Potential problem areas such as Bay Flats, or other areas with Reyes soils which require over-irrigation, will be monitored by the City three times per week. Checks will occur throughout the life of the Project or until the landowner no longer utilizes reclaimed water for irrigation.

2.2.8 Revegetate Temporarily Disturbed Sites

Description:

The City will implement a Revegetation Program that will revegetate all sites disturbed or scarred by construction activities. The Revegetation Program will require the following:

Streams and other Waters of the U.S.

1. Remove any sediments deposited in stream channels due to construction activities.

2. Restore original contours and drainage patterns.

3. Implement immediate stream bank stabilization measures such as revegetation with willow wattles at woody crossings and covering disturbed herbaceous stream banks with a biodegradable fiber (jute) cloth or coconut fiber rolls or another similar erosion control fabric.

4. Collect seed stock or cuttings for any riparian revegetation as near to the stream crossing as possible (taking into consideration microclimate and time of year for propagation) and preferable from vegetation removed at the stream crossing.

5. Limit artificial seeding and avoid use of soil amendments such as lime or fertilizers.

6. Encourage natural regeneration of native herbaceous vegetation from surrounding areas/wetlands.

7. Spread a cover of straw, rice straw if available, over all areas of disturbed soils and use a straw punch to work into soil.

8. Apply an organically based tackifier on disturbed areas to reduce air and water erosion of soils.

Upland Sites

1. Upon completion of construction of a Project component, the construction manager shall restore the site to pre-existing topographic features. In those cases where full restoration is not possible, graded contours shall be rounded to emulate the natural landforms of the adjacent area.

2. The Revegetation Plan shall provide measures to ensure that trenching scars associated with pipeline construction are revegetated with drought tolerant plant species common to the disturbed area.

3. Seed material of woody and herbaceous plants shall be collected from the construction corridor and/or adjacent undisturbed vegetation during a suitable season for each group of plants. Potted plant materials will be used to replace woody vegetation (i.e., trees and shrubs).

4. Dried seed material collected as specified earlier shall be applied evenly to the finish-graded topsoil surface. Seed material shall be used on the construction site from which it was collected.

Monitoring

1. Revegetated areas shall be monitored annually for five years following construction.

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa/U.S. Army Corps of Engineers

Implementing Agency: City of Santa Rosa and construction manager

Timing: **Start:** During construction of Project components.

Complete: Revegetation will be completed within one year of completion of a Project component. Monitoring reports should be submitted annually to the Corps, the California Department of Fish and Game, and any other responsible agency for at least five years or until it is demonstrated that success criteria have been met.

Monitoring Agency: City of Santa Rosa

Validation: Review annual reports beginning with end of first growing season following construction. Conduct field monitoring on yearly basis or as deemed appropriate. Review annual reports and conduct monitoring annually for five years.

2.2.9 Retain Stripped Topsoil

Description: The construction manager will ensure that the first six inches of topsoil is stripped from all areas to be occupied by structures, and all areas to be excavated, graded, or filled. The stripped topsoil will be stockpiled on-site, in areas designated on project maps, and will not be mixed. Topsoil will be stockpiled free from vegetation, trash, large stones, and other extraneous materials, to the extent possible. Stockpiled topsoil will be protected from disturbance, rainfall, and erosion until it can be placed as final grade in its original location.

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: Construction manager

Timing: **Start:** During construction. The City of Santa Rosa will monitor the construction manager's compliance on a daily basis during construction.

Complete: At the completion of construction.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City of Santa Rosa will monitor the construction manager's compliance on a daily basis at the end of each work day.

2.2.10 Storm Water Pollution Prevention Plan

Description:

The City of Santa Rosa will implement a project Storm Water Pollution Prevention Plan (SWPPP). The Prevention Plan is required by the State Water Resources Control Board NPDES General Construction Activity Storm Water Permit (discussed in Section 4.3, under Regulatory Framework). The Prevention Plan will include, at a minimum, the following elements:

Jack and bore construction of live streams (refer to Measure 2.2.5).

Construction will be performed to minimize soil exposure. This should include measures to limit construction during the rainy season.

New cut and fill slopes and soil stockpiles will be revegetated, mulched, or otherwise protected immediately upon completion of permanent or temporary winter slopes.

Runoff will be diverted away from construction areas that have been denuded or otherwise disturbed.

Sediment will be retained on site by the proper use of silt fences, hay bales, sedimentation basin, or other structures.

Erosion and sediment control facilities will be inspected and maintained through the construction phase of the Project.

Minimize cut and fill along streams through the use of steepened side slopes, retaining walls and extended culverts.

Cut vegetation off at ground level, leaving existing root systems intact.

Pulling of tree stumps will be limited to the graded area directly over the pipeline trench. Tree stumps or root systems from the rest of the right of way in wetlands will not be removed unless safety-related construction constraints require such.

A site-specific Storm Water Pollution Prevention Plan shall be prepared for each construction area, and if special measures are necessary for a site, these measures will be incorporated into the Prevention Plan.

Alternative/Components: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** During the Project design phase.

Complete: At the end of construction.

Monitoring Agency: North Coast or San Francisco Bay Regional Water Quality Control Board must approve the Storm Water Pollution Prevention Plan

Validation: The Board will review the adequacy of the prevention Plan prior to the issuance of the NPDES General Construction Activity Storm Water Permit.

The City will monitor compliance with the Prevention Plan throughout construction.

2.2.11 Protect Creeks from Toxic Discharge

Description: During construction, the construction manager will follow pertinent paragraphs of the Caltrans Manual, California Standard Specifications (Caltrans 1992), Section 7-1.01G which begins, "The contractor will exercise every reasonable precaution to protect streams from pollution with fuels, oils, bitumens, calcium chloride, and other harmful materials." Measures will include:

1) Construction byproducts and pollutants such as oil, cement, and washwater will be prevented from discharging into streams and will be collected and transported to a landfill authorized to accept hazardous wastes.

2) No construction vehicles or equipment may be parked within the upland riparian corridor of any stream channel.

3) Equipment may only be refueled and serviced at the designated construction staging area.

4) Building material storage areas containing hazardous or potentially toxic materials will be bermed to prevent the discharge of pollutants to runoff water. These materials will be stored under cover at all times (even during the work day).

5) Utilize good housekeeping practices, safer alternative products where feasible, and employee training programs to prevent or reduce the discharge of pollutants to runoff water from construction activities.

6) Construction vehicles and equipment will be maintained to prevent contamination of soil (from leaking hydraulic fluid, fuel, oil, and grease).

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: Construction Manager

Timing: **Start:** At the start of construction. The City of Santa Rosa will monitor the construction manager's compliance on a daily basis during construction.

Complete: At the completion of construction.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City of Santa Rosa will monitor the construction manager's compliance on a daily basis at the end of each work day.

2.2.12 Concrete Waste Management

Description:

The construction manager will designate concrete washout areas for vehicles carrying concrete. Designated areas will be approved by the California Department of Fish and Game and the Sonoma County Environmental Health Department prior to the start of construction.

The construction manager will restrict wash-out of concrete vehicles and equipment to designated areas only.

The construction manager will brief all employees and sub-contractors in concrete waste management procedures.

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: Construction Manager

Timing:

Start: At the start of construction.

Complete: At the end of construction.

Monitoring Agency: City of Santa Rosa Utilities Department and California Department of Fish and Game

Validation: The City of Santa Rosa will monitor the construction manager's compliance on a daily basis at the end of each work day.

2.2.13 Pipeline Features in Active Fault Zones

Description:

Isolation Valves

The City of Santa Rosa will design pipelines crossing the Rogers Creek/Healdsburg and Maacama faults with manually operated isolation valves. The isolation valves will be on both sides of the pipeline crossing, located a distance of one thousand feet from the fault zone.

High Pressure Pipeline

The City of Santa Rosa will design pipelines crossing the Rogers Creek/Healdsburg and Maacama faults to be high pressure class pipe that can accommodate some surface offset. The high pressure pipeline will extend two thousand feet on both sides of the fault zone.

Alternative/Component: Alternative 4

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: City of Santa Rosa Utilities Department

Timing: **Start:** During design.

Complete: Prior to certification of Final Engineering Drawings.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City will comply with this measure prior to certifying the Final Engineering Drawings.

2.2.14 Dam Safety

Description:

The State of California requires that an inundation map be prepared for any dam which either is 25 feet or more in height or impounds 50 acre feet or more of water (California Water Code, §6002 and California Government Code §8589.5). The City has prepared an inundation map for each potential reservoir site. The map for the proposed reservoir site will be submitted by the City of Santa Rosa to the Office of Emergency Services (OES) for review and approval. Following approval, OES will transmit the map back to the City who will then produce evacuation plans within six months. These plans, which are also subject to OES review may be required to include;

Traffic control measures;

Shelters for evacuees;

Movement of people without their own transportation and from "unique" institutions;

Perimeter security for the evacuation area; and

Reentry of the evacuation area.

Alternative/Component: Alternatives 2 and 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Upon certification of the EIR.

Complete: The City will develop and submit an evacuation plan to the Office of Emergency Services within six months of receiving the approved inundation map.

Monitoring Agency: Office of Emergency Services (OES)

Validation: The City will maintain a copy of the OES approved inundation map and evacuation plan at the Laguna Wastewater Treatment Plant Library and at other administrative offices.

2.2.15 Standard Traffic Control Procedures

Description:	Prior to construction of a Project component, the City of Santa Rosa will implement standard traffic control measures to avoid potential impacts to roads and traffic congestion. At a minimum, the procedures to be implemented by the City of Santa Rosa will contain Measures 2.2.16 through 2.2.24, discussed below.
Alternative/Component:	Alternatives 2, 3, 4, and 5a
Lead Agency:	City of Santa Rosa Utilities Department
Implementing Agency:	City of Santa Rosa Utilities Department
Timing:	**Start:** During construction of each Project component.
	Complete: Implementation will continue throughout construction.
Monitoring Agency:	City of Santa Rosa Utilities Department
Validation:	The City will comply with this measure prior to starting construction of a Project component.

2.2.16 Emergency Response Vehicles Will Not be Impeded

Description:

The City will ensure that construction of the Project does not impede emergency response vehicles. For each Project component, the City will inventory the locations of emergency response providers (hospitals, police, fire, and ambulance) and their primary response routes.

Where Project facilities or pipelines have been sited along emergency response routes, the City will recommend and obtain approval of alternate emergency response routes from the affected service, at a minimum of one week prior to construction.

During construction, the City will notify the emergency services on a weekly basis of the timing, location, and duration of construction activities throughout the Project for that week and a schedule of construction activities by area and date.

A copy of the construction activity schedule will be maintained at selected public libraries and City offices.

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: City of Santa Rosa Utilities Department

Timing:

Start: The inventory will be started during component design. Notification of construction activities will occur on a weekly basis.

Complete: At the completion of the construction period.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City will comply with this measure prior to starting construction of a Project component.

2.2.17 Maintain Maximum Number of Open Lanes on Roadways

Description:

Where Project construction occurs in or along roadways, the maximum number of through traffic lanes will be kept open. A minimum of one lane of through traffic will be maintained at all times.

Where single-lane, one-way operation is required, the construction manager will mark construction zones and provide traffic control in accordance with Caltrans "Manual of Traffic Controls for Construction and Maintenance of Work Zones" (Caltrans 1990). This will include, but not be limited to, appropriate signage marking all construction zones and flag persons or electronic signal control at each end of the restricted lanes.

Where construction of an open trench requires closure of the road, temporary bypass roads may be built within the construction right-of-way allowing temporary access .

Where temporary road closure is necessary, a temporary road closure plan will be developed by the construction manager and submitted to, and approved by, the Traffic Engineer of the affected jurisdiction, at least four weeks prior to scheduled road closure. The temporary road closure plan will include:

Road name and closure location
Duration of road closure
Length of road to be closed
Alternate detour routing
Notification of local fire and police departments

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: City of Santa Rosa Utilities Department and Construction Manager

Timing: **Start:** Road closure plans will be submitted at least four weeks prior to scheduled closure.

Complete: At the completion of construction.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City will comply with this measure prior to starting construction of a Project component.

2.2.18 Jack and Bore Construction at Major Highways

Description:

The City of Santa Rosa will design pipelines crossing high volume roadways, all railroads, and Sonoma County Water Authority Aqueducts to utilize the jack and bore construction method so as not to disrupt the flow of traffic and commerce. The following crossings will be constructed using jack and bore:

Highways

State Hwy 128 at Pine Flat Rd
Old Redwood Hwy at Pleasant Ave
Hwy 101 at Conde Ln
River Rd at Olivet Rd
Guerneville Rd at Willowside Rd
Hwy 101 at N. Santa Rosa Flood Channel
Old Redwood Hwy at N. Santa Rosa Flood Channel
Hopper Rd at N. Santa Rosa Flood Channel
Old River Rd near Denner Rd
Hwy 116 at Green Valley Rd
Occidental Rd at Barlowe Rd
Yalupa Ave at Bennett Valley Rd
Hwy 116 at Llano Rd
Roblar Rd near Orchard Station Rd
Bodega Ave at Spring Hill Rd
Fallon Two Rock Rd at Twin Bridges Rd
Fallon Two Rock Rd at Alexander Rd
Valley Ford Rd at Roblar Rd
Valley Ford Rd at Bloomfield Rd
Bodega Hwy at Ferguson Rd
Valley Ford Rd at Shoreline Hwy
Valley Ford Rd at Walker Rd
Meecham Rd at Pepper Rd
Stony Pt at Meecham Rd
Stony Pt at Pepper Rd
Stony Pt at Thomas Rd
Old Redwood Hwy at Railroad Ave

Railroads

Northwestern Pacific Railroad at Copeland Creek
Northwestern Pacific Railroad at Shiloh Rd
Northwestern Pacific Railroad at 3rd St.
Northwestern Pacific Railroad at Piner Creek

SCWA Aqueducts

Hwy 101 at Sonoma Ave
Eastside Rd at Trenton -Healdsburg Rd
Slusser Rd near Mark West Creek
Guerneville Rd near Delta Ponds
Hwy 116 near Stony Pt Rd
Stony Pt Rd near Madrone Rd
Copeland Creek near NWP Railroad

Alternative/Component:	Alternatives 2, 3, 4, and 5a
Lead Agency:	City of Santa Rosa of Santa Rosa Utilities Department
Implementing Agency:	City of Santa Rosa of Santa Rosa Utilities Department
Timing:	**Start:** Design phase of each component.
	Complete: Upon certification of Final Engineering Drawings.
Monitoring Agency:	City of Santa Rosa of Santa Rosa Utilities Department
Validation:	The City will comply with this measure prior to certifying the Final Engineering Drawings.

2.2.19 Fence or Cover Trenches

Description: During construction, the construction manager will require all trenches to be backfilled within four hours of completion of component installation.

While under construction, the construction manager will cover all open trenches with steel plating where the trench crosses roadways or prevents access to businesses or residences, if feasible.

When possible, the construction manager will not leave trenches uncovered overnight. All trenches left uncovered will be fenced and marked with appropriate signage in accordance with Caltrans "Manual of Traffic Controls for Construction and Maintenance of Work Zones" (Caltrans 1990).

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: City of Santa Rosa Utilities Department and Construction Manager

Timing: **Start:** At the beginning of component construction. The City of Santa Rosa will monitor the construction managers compliance on a daily basis at the end of each work day.

Complete: At the completion of construction.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City will check compliance with this measure daily, throughout construction.

2.2.20 Access to Businesses and Residences

Description:

Ninety days prior to construction of a Project component, the City of Santa Rosa will provide all public facilities, businesses, and residences within 500 feet of the construction zone with a notification packet that describes Project construction activities scheduled for their neighborhood. Notification will also be provided in local newspapers.

The notification packet will include:

1) Notice to residences and businesses that parking and access will be disrupted.

2) Name of the Project sponsor, Project purpose, and a brief Project description.

3) Affected roadway segments in area, construction schedule in affected area, affected travel lanes, and reference to the traffic control plan.

4) Applicable detour routing and alternate access and/or parking for affected land uses.

5) Name and phone number of a Project manager the public can contact with questions or comments regarding any aspect of the Project.

During construction, the construction manager will maintain pedestrian and vehicular access to all public facilities, businesses, and residences along the route.

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: City of Santa Rosa Utilities Department and Construction Manager

Timing: **Start:** Ninety days prior to construction.

Complete: At the completion of construction.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City will perform daily checks to ensure access is maintained to private and public uses. The City will respond to complaints from private citizens regarding restricted access within 24 hours.

2.2.21 Repair Road Damage

Prior to construction, the City of Santa Rosa will survey and videotape the condition of all roads scheduled to have construction on or adjacent to them. The survey will identify road name, length, and width; surface type and condition; and shoulder surface type and condition.

Within one year of completion of construction, roads damaged by construction traffic or pipeline construction will be repaired to a condition equal to or better than that which existed prior to the construction activity.

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: City of Santa Rosa Utilities Department

Timing: **Start:** Prior to construction of a Project component. The City of Santa Rosa will review the road survey prior to authorizing construction along roads.

Complete: Within one year after completion of construction of a Project component.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City will complete road repairs within one year of completion of construction of a Project component. The City will demonstrate compliance with this measure by videotaping the conditions of all roads where construction activities occurred.

2.2.22 Park Within Construction Easements

Description: The construction manager will establish construction staging areas. All construction worker vehicles, construction equipment, and materials will be kept within the staging area. Construction easements at the pump station will be expanded to accommodate all construction related activity.

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: City of Santa Rosa Utilities Department and Construction Manager

Timing: **Start:** Prior to the start of construction.

Complete: At completion of construction.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City will check compliance with this measure daily, throughout construction.

2.2.23 Limit Delivery Hours

The City of Santa Rosa will restrict construction deliveries to off-peak commute hours. Peak commute hours are between 7:00 a.m. and 9:00 a.m. in the morning and 4:00 p.m. and 6:00 p.m. in the evening.

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: Construction Manager

Timing: **Start:** At the beginning of construction. The City of Santa Rosa will monitor the construction manager's compliance on a daily basis during construction.

Complete: At the completion of construction.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City will check compliance with this measure daily, throughout construction.

2.2.24 Limit Ingress/Egress of Construction Equipment

Description:

During construction, the construction manager will ensure that ingress and egress of construction equipment onto highways from construction parking areas and access roads is conducted in accordance with Caltrans "Manual of Traffic Controls for Construction and Maintenance of Work Zones" (Caltrans 1990).

Adequate traffic controls will be provided at access road intersections in accordance with Caltrans "Manual of Traffic Controls for Construction and Maintenance of Work Zones" (Caltrans 1990).

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: Construction Manager

Timing:

Start: At the beginning of construction. The City of Santa Rosa will monitor the construction manager's compliance on a daily basis during construction.

Complete: At the completion of construction.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City will check compliance with this measure daily, throughout construction.

2.2.25 Minimize/Reduce Fossil Fuel Consumption

Description:

During construction, the construction manager will implement the following measures to minimize fossil fuel consumption:

Construction vehicles and equipment will be maintained and tuned at the interval recommended by the manufacturers.

Construction equipment idling will be kept to a minimum when equipment is not in use. No piece of equipment will idle in one place for more than 30 minutes.

Maintain stockpiles to avoid trucks hauling less than full loads.

Coordinate construction equipment use to minimize actual hours of operation.

Encourage construction crews to car pool.

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa Utilities Department

Implementing Agency: Construction manager

Timing:

Start: During construction. The City of Santa Rosa will monitor the construction manager's compliance on a daily basis during construction.

Complete: At the completion of construction.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City of Santa Rosa will monitor the construction manager's compliance on a daily basis at the end of each work day.

2.2.26 Odor Control for Sludge Handling

Description:

The following odor control measures for sludge handling are being implemented at the Laguna Wastewater Treatment Plant as part of the adopted mitigation for the Santa Rosa Subregional Sludge Beneficial Use Project. The City incorporates these measures into the Long-term Wastewater Project:

De-watered biosolids from the Laguna Wastewater Treatment Plant will be delivered to destinations as quickly as possible and not stored on-site. A specific plan will be developed as part of Project design to accomplish this. Destinations include the compost facility, land application site, and the Central Landfill.

Mixing of the biosolids and bulking agent shall be done in an area that is either covered or enclosed. Covering protects against rainfall, and enclosure permits the air to be collected and treated.

Anaerobic digestion of the biosolids prior to de-watering (practiced at the Laguna plant) will be done to significantly reduce odors of digested biosolids compared raw biosolids by stabilizing it.

De-watered biosolids applied to agricultural land will be quickly applied. Where possible it will be incorporated into the soil. This will reduce vector attraction and potential runoff impacts.

The Subregional System will employ process control measures including proper housecleaning procedures such as rapid cleanup of spillage and frequent wash down of hauling trucks and conveyance equipment.

The agitated bed process will be utilized to provide continuous mixing of compost to prevent formation of anaerobic regions within the compost pile and to provide control over moisture and temperature. The agitated bed process is an enclosed system which will permit ambient air as well as process air to be collected and treated.

Process air and ambient air will be treated by either a compost bio-filter or a two-stage chemical scrubber.

Compost production and yard waste delivery will be scheduled to meet demands and minimize the need for storage.

Sludge will be treated by anaerobic digestion (defined by federal regulations as a Process to Significantly Reduce Pathogens).

Alternative/Component:	Alternatives 2, 3, 4, and 5
Lead Agency:	City of Santa Rosa Utilities Department
Implementing Agency:	Laguna Treatment Plant Operations
Timing:	**Start:** Measures are already being implemented as part of the Laguna Wastewater Treatment Plant's Biosolids Management Program. **Complete**: Ongoing, throughout the life of the Project.
Monitoring Agency:	City of Santa Rosa Utilities Department
Validation:	The City of Santa Rosa will monitor and evaluate implementation of these measures annually.

2.2.27 Uniform Relocation Assistance

Description:	The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646) will govern all of the acquisition and displacement actions related to the implementation of the proposed Project. Affected property owners and businesses, depending on eligibility, will be afforded various services and forms of compensation in accordance with the provisions of this act.
Alternative/Component:	Alternatives 2 and 3
Lead Agency:	City of Santa Rosa
Implementing Agency:	City of Santa Rosa
Timing:	**Start:** Upon certification of the EIR. **Complete:** Prior to the start of construction.
Monitoring Agency:	City of Santa Rosa
Validation:	Compensation of affected property owners and business shall be agreed upon prior to construction.

2.3 PLANNING MEASURES

This section contains mitigation measures to be implemented during the final planning and detailed design of the Project. These measures often require the refinement of the final Project design to accommodate particular environmental constraints. Compliance with these mitigation measures would result in avoidance and/or minimization of adverse environmental impacts.

2.3.1 Replacement of Open Space Easements

Description: The City shall contribute funds to the Sonoma County Agricultural Preservation and Open Space District as compensation for land acquired for Pump Station G3. The City's cash contribution shall be equal to the value of the land acquired for the pump station. All moneys contributed by the City shall be utilized in accordance with the Sonoma County Open Space Expenditure Plan.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
1.6.2. The pump station component may convert public open space for Project facilities.	Alt 4 - Less than Significant

Alternative/Component: Alternative 4

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Upon certification of EIR.

Complete: Prior to the beginning of construction.

Monitoring Agency: City of Santa Rosa and Sonoma County Agricultural Preservation and Open Space District

Validation: A Memorandum of Agreement shall be signed between the City and the District prior to the beginning of pump station construction.

2.3.2 Restrict Approval of Agricultural Irrigation Contracts

Description: The City shall not approve irrigation contracts for new orchards and vineyards on slopes greater than 10% or for specialty crops on slopes greater than 5% (as identified in Measure 2.2.4). Approval of contracts for these lands shall be granted only after the City of Santa Rosa has completed a demonstration program showing that the restricted agricultural uses can be conducted on these sloped lands without causing excessive soil erosion. The demonstration program is explained under Mitigation Measure 2.3.3.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
2.7.3. The agricultural irrigation component may reduce agricultural soil productivity due to erosion of topsoil.	Alts 2 and 3 - Less than Significant

Alternative/Component: Alternatives 2 and 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa Utilities Department

Timing: **Start:** Prior to the delivery of water for agricultural irrigation.

Complete: This restriction shall be in place for the life of the Project.

Monitoring Agency: City of Santa Rosa

Validation: This restriction shall be maintained throughout the life of the Project or until studies show that this measures is no longer necessary.

2.3.3 Agricultural Irrigation Demonstration Program

Description:

Prior to approval of irrigation contracts for new orchards and vineyards on slopes greater than 10% or for specialty crops on slopes greater than 5%, the City shall conduct a demonstration program utilizing a number of erosion control practices and monitor erosion. If the City can demonstrate that there are effective and feasible erosion control measures that enable new orchards and vineyards to be grown on slopes greater than 10% or for specialty crops to be grown on slopes greater than 5%, without exceeding the T value as established in the Irrigation Management Guidelines Technical Memorandum, then contracts for irrigation on similar slopes with similar crops may be signed.

Monitoring of these contracts shall include erosion measurements for the first two seasons; contracts are subject to cancellation if erosion cannot be reduced below the T value.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
2.7.3. The agricultural irrigation component may reduce agricultural soil productivity due to erosion of topsoil.	Alts 2 and 3 - Less than Significant

Alternative/Component: Alternatives 2 and 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa Utilities Department

Timing:

Start: Prior to approval of irrigation contracts for new orchards and vineyards on slopes greater than 10% or for specialty crops on slopes greater than 5%.

Complete: The program shall be complete upon the successful demonstration that T values will not be exceeded. Monitoring of any lands approved for such contracts shall occur throughout the life of the Project.

Monitoring Agency: City of Santa Rosa

Validation:

Irrigation contracts for new orchards and vineyards on slopes greater than 10% or for specialty crops on slopes greater than 5% can only be established if the City is able to successfully complete a irrigation demonstration program that demonstrates application of erosion control technology is able to maintain soil loss at acceptable rates for long-term sustainable agriculture. Monitoring of lands approved for such contracts shall occur throughout the life of the Project.

2.3.4 Slope Stabilization Design

Description:

The City shall retain a licensed geotechnical engineer and a structural engineer to conduct construction level geotechnical investigation of the pipeline routes, pump station areas, and the storage reservoir site. The investigation shall identify slope stability risk areas and provide engineering design and construction recommendations to stabilize slopes at the dam, on the slopes around the reservoir, at pump station areas, and at pipeline routes. Slope stability recommendations shall include, but not be limited to, the following measures:

Removal and replacement of unstable materials in an existing landslide with a stronger material.

Grading to an acceptably stable topographic configuration by terracing, reducing slope angles, and reducing the height of cut and fill slopes.

Drainage facilities, such as subdrains and dewatering wells to reduce pore water pressure and reduce the risk of slope failure.

Buttressing the toe of slopes to provide additional support to the slope.

Where buttressing is not feasible, internal reinforcement such as a pinning system or lattice grid can be incorporated into the slope design to strengthen the slope.

Retaining walls or other external applications to strengthen slopes.

In addition, within the geysers steamfield area, pipeline alignments can be adjusted to avoid areas with slope stability problems.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
3.4.1 The pipeline component may be located within areas of unstable slope conditions.	Alts 2 and 3 - Less than Significant Alt 4 - Significant.
3.5.1 The storage reservoir component may be located in an area of unstable slope conditions.	Alt - Significant
3.8.1 The geysers steamfield component may be located in an area of unstable slope conditions.	Alt 4 - Less than Significant

Alternative/Component: Alternatives 2, 3, and 4

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** During the Project design phase.

Complete: Prior to issuance of grading permit.

Monitoring Agency: City of Santa Rosa and Division of Safety of Dams

Validation: The City will comply with this measure prior to certifying the Final Engineering Drawings or issuance of a grading permit.

2.3.5 Liquefaction Stabilization Design

Description:

The City shall retain a registered geotechnical engineer to conduct a detailed, facility specific, soil analysis in areas mapped by California Division of Mines and Geology as having a "high" liquefaction potential. The analysis shall determine locations where facilities could be damaged by liquefaction and shall include:

Identification of density profiles;

Determination of maximum shallow groundwater levels; or

Characterization of the vertical and lateral extent of saturated sand/silt layers that could undergo liquefaction during strong ground shaking.

Where facility specific testing indicates that conditions are present that could result in liquefaction and damage to Project facilities, appropriate, feasible measures shall be included in the site specific soils analysis and shall be incorporated into the Project design. These measures shall include the following, unless the site-specific soils analysis dictates otherwise:

Densification or dewatering of surface and subsurface soils.

Construction of concrete foundations to support pipelines or pile foundations to support buildings.

Removal of material that could undergo liquefaction in the event of an earthquake and replacement with stable material.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
3.4.3 The pipeline component may be located in areas with soils and groundwater conditions that are susceptible to liquefaction during an earthquake.	Alts 2, 3, 4, and 5a - Less than Significant
3.6.3 The pump station component may be located in areas with soils and groundwater conditions that are susceptible to liquefaction during an earthquake.	Alts 2, 3, and 4 - Less than Significant
3.9.3 The discharge component may be located in areas with soils and groundwater conditions that are susceptible to liquefaction during an earthquake.	Alt 5a - Less than Significant

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa, Utilities Department

Timing: **Start:** During Project design.

Complete: Upon completion of construction.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City shall retain a Registered Geotechnical Engineer to verify compliance with this measure.

2.3.6 Standard Engineering Methods for Corrosive Soils

Description:

Conduct Pre-Design Soil Analysis

Prior to design the City shall hire a Certified Professional Soil Scientist to conduct a soil survey along all pipeline alignments. The survey shall record soil type and soil properties (including pH, salinity, and active sulfides).

The Certified Professional Soil Scientist shall conduct an analysis of soil properties and the chemical interaction between soil, groundwater, and pipe materials. The analysis shall include a determination of pipeline alignments requiring corrosion prevention measures.

Pipelines Traversing Reyes Soils

The City shall design pipelines that traverse Reyes soils to be comprised of coated steel, or equivalent, to reduce potential damage from corrosive soils.

Pipelines Traversing Highly Corrosive Soils

The City shall design pipelines that traverse highly corrosive soils to utilize non-corrodable materials such as PVC or have an active cathodic protection system (one that applies a current to the pipe and protects metals from effects of low pH).

Agricultural Irrigation Pipelines

Agricultural irrigation pipelines traversing Reyes soils or highly corrosive soils shall either be constructed as described above or they shall be constructed with PVC pipe (or equivalent).

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
3.4.8 The pipeline component may be exposed to damage due to corrosive soils.	Alt 2 - Less than Significant
3.7.8 The agricultural irrigation component may be exposed to damage due to corrosive soils.	Bay Flats and Lakeville Irrigation- Less than Significant

Alternative/Component: Alternative 2, Bay Flats and Lakeville Irrigation Component

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa Utilities Department

Timing: **Start:** During Project design.

Complete: At the completion of the design phase.

Monitoring Agency: City of Santa Rosa Utilities Department

Validation: The City will comply with this measure prior to certifying the Final Engineering Drawings. The City shall retain a Certified Professional Soil Scientist to verify compliance with this measure.

2.3.7 Slope Monitoring and Response System

Description:

The City shall develop and install a slope stability monitoring system along unstable portions of Pine Flat Road (the geysers pipeline alignment). The monitoring system shall include slope inclinometers to measure changes in slope angles and piezometers to measures changes in water levels and pore water pressure that could indicate active slope movement. The monitoring system would provide advanced warning of slope failure that could damage pipelines.

If accelerated slope movement is detected, then immediate corrective action, such as pipe maintenance or activation of isolation values and draining of pipeline segments, shall occur. Areas experiencing accelerated slope movement shall have additional slope stabilization measures applied. These measures are discussed under Measure 2.3.4.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
3.4.1 The pipeline component may be located within an area of unstable slope conditions.	Alt 4 - Significant Alts 2 and 3 - Less than Significant

Alternative/Component: Alternatives 2, 3, and 4

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa, Utilities Department

Timing: **Start:** During design. The slope monitoring system shall be in place prior to operation of the Project.

Complete: For the duration of the Project.

Monitoring Agency: City of Santa Rosa, Utilities Department

Validation: The City will comply with this measure prior to certifying the Final Engineering Drawings.

2.3.8 Earthquake Preparedness and Emergency Response Program

Description:

The City shall develop and implement an Earthquake Preparedness and Emergency Response Program. The Program shall be detailed and shall include, at a minimum, the following elements (to be indicated on the Final Engineering Drawings, where appropriate):

Identify specific pipeline locations that would be vulnerable to damage in an earthquake and define priorities for system repairs.

House emergency equipment and supplies at key locations along the transmission distribution system.

Dams shall be inspected by a registered Civil Engineer following strong ground shaking events, and corrective action shall be taken if damage is observed.

Ensure that emergency power supply, such as back up generators, would be available to supply electricity to critical facilities.

Provide all plant operators and irrigation system operators with emergency response training.

Provide training for personnel in first aid and cardiopulmonary resuscitation.

Conduct practice drills, using simulated earthquake scenarios, of emergency response procedures annually.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
3.4.1 The pipeline component may be located within an area of unstable slope conditions.	Alt 4 - Significant Alts 2 and 3 - Less than Significant
3.4.2 The pipeline component may be subject to ground rupture due to location near surface trace of an active fault.	Alts 2, 3, and 4 - Significant
3.8.4 The geysers steamfield component may induce seismicity.	Alt 4 - Less than Significant

Alternative/Component: Alternatives 2, 3, and 4

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa, Utilities Department

Timing: **Start:** The Program shall be developed during Project design.

Complete: Implementation of the Program shall occur upon completion of construction. Training and practice drills shall be conducted annually, throughout the life of the Project.

Monitoring Agency: City of Santa Rosa, Utilities Department

Validation: The Program shall be developed prior to certification of the Final Engineering Drawings.

2.3.9 Adjust Pipeline Alignments

Description:

During final design of the pipelines, alignments of pipelines shall be adjusted within the Project corridor to avoid visually sensitive features and conditions which would result in major landform alteration or mature landscape removal. Visually sensitive features include significant stands of oaks and eucalyptus, visually significant rock outcroppings, highly visible steep slopes, and highly visible roadside foreground areas. For example, the pipeline alignment along Lakeville Highway shall be adjusted from one side of the highway to middle of the highway to avoid destruction of the visually significant eucalyptus trees.

As previously discussed in Measure 2.2.5, Avoid Sensitive Biological Resources, pipelines will be sited to avoid protected trees (as defined by the Sonoma County and Marin County tree ordinances).

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
14.4.2 The pipeline component may be inconsistent with the Sonoma County or City General Plans regarding scenic landscape units.	Alts 2, 3, 4, and 5a - Less than Significant
14.4.3 The pipeline component may be inconsistent with the Sonoma County or City General Plans regarding scenic corridors.	Alts 2, 3, 4, and 5a - Less than Significant
14.4.5 The pipeline component may cause an adverse effect on foreground or middleground views from a high volume highway, recreation use area, or other public use area.	Alts 2, 3, and 5a - Less than Significant Alt 4 - Significant
14.4.6 The pipeline component may cause an adverse effect on foreground or middleground views from one or more private residences.	Alts 2, 3, 4, and 5a - Less than Significant

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** During Final Design.

Complete: Prior to the beginning of construction.

Monitoring Agency: City of Santa Rosa

Validation: The Plan shall be developed prior to certification of the Final Engineering Drawings.

2.3.10 Limit Construction Disturbance

Description:

During final design of the Project, the City shall review all construction zones and staging areas to ensure they are kept to a minimum operable size in order to minimize the visual impacts construction areas. Construction activities which would increase the amount of disturbance outside of the construction zone shall also be limited. These include

the number and extent of access roads (temporary or permanent) and widened right of way clearing to accommodate construction staging areas and material storage. In addition, the boundaries of these areas shall be designed to have curvilinear, rather than straight, boundaries in order to prevent the creation of stark, highly contrasting boundaries.

All changes in construction zone size shall be clearly indicated on the Final Engineering Drawings.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
10.4.1 The pipeline component may destroy wetlands or other waters of the U.S.	Alt 2, 3, 4, and 5a - Less than Significant
14.4.1 The pipeline component may be inconsistent with the Sonoma County General Plan Open Space Element regarding Community Separator areas.	Alt 2, 3, and 4 - Less than Significant
14.4.2 The pipeline component may be inconsistent with the Sonoma County or City General Plans regarding scenic landscape units.	Alts 2, 3, 4, and 5a - Less than Significant
14.4.3 The pipeline component may be inconsistent with the Sonoma County or City General Plans regarding scenic corridors.	Alts 2, 3, 4, and 5a - Less than Significant
14.4.5 The pipeline component may cause an adverse effect on foreground or middleground views from a high volume highway, recreation use area, or other public use area.	Alts 2, 3, and 5a - Less than Significant Alt 4 - Significant
14.4.6 The pipeline component may cause an adverse effect on foreground or middleground views from one or more private residences.	Alts 2, 3, 4, and 5a - Less than Significant

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** During Final Design.

Complete: Prior to the beginning of construction.

Monitoring Agency: City of Santa Rosa

Validation: The Plan shall be developed prior to certification of the Final Engineering Drawings.

2.3.11 Sensitive Resource Conservation Program

Description:

Construction of reservoir sites shall not result in a net-loss of the sensitive resources or the function and value of jurisdictional wetlands. In order to meet this criterion, following Project selection, the City shall prepare and implement a Project-specific Sensitive Resource Conservation Program. The Sensitive Resource Conservation Program will contain elements and measures that upon implementation, will compensate for the loss of biological resources through the creation, restoration and long-term preservation of comparable biological resources.

Creation of habitat and associated ecological communities is possible through building and reconstructing habitats and ecological communities in situations where these habitats and communities previously have not existed or have been historically eliminated. Restoration is the re-establishment of biological and/or physical function in sites where some habitat or community elements remain intact though the habitat or community is highly degraded. Restoration processes replace missing elements and abrogate degrading processes, allowing the biological function of the historic condition to return over time. Preservation is the provision of long-term protection of existing resources.

Due to the nature of each of these mitigation processes (creation, restoration and preservation), the potential for success, and the potential net benefit that each process offers, the compensatory value of each process may differ. Mitigation ratios, (compensatory acreage: impact acreage), will be determined by the functions and values of the impacted resources, the expected functions and values of the future condition of the compensation site and the mitigation processes involved (see Table 2.3-1).

Many of the biological resources of the reservoir sites, though measurable as separate and distinct units, are functionally inter-related within the local ecosystem. Though the significance of potential impacts was analyzed for each distinct sensitive resource, compensatory mitigation for integrally related resources should be conducted on an ecosystem basis in order to incorporate all related resources into a coordinated and functional whole.

Table 2.3-1 presents the types of sensitive biological resources unavoidably impacted by construction at any of the nine proposed storage reservoir sites (10 proposed storage reservoir configurations) identified in the Project description, and corresponding minimum mitigation obligations.

The mitigation options and ratios presented in Table 2.3-1 are alternatives, which can be combined in order to achieve mitigation for the entirety of the lost sensitive biological resources. The total acreage of creation of new wetland or aquatic habitat will be at least equal to the acreage of Section 404 impacts (fills, excavation, and directly

consequent losses) on jurisdictional wetlands and other waters of the U.S.; with the following exceptions:

- Restoration of cropland to natural wetland habitat conditions, coupled with permanent protection under a conservation easement, will be regarded as habitat creation.

- Where substantial and verifiable lateral expansion of existing wetland habitat along drainage systems can be demonstrated to result from mitigation actions, credit for habitat creation may be deemed to have occurred.

Mitigation Opportunities

There are a variety of opportunities for habitat and community creation, restoration and preservation in Sonoma and Marin counties. Each of the 10 reservoir sites evaluated in this EIR/EIS provide opportunities to implement this measure. Other opportunities are identified in the *Mitigation for Wetlands and Waters of the U.S. for Proposed Reservoir Site* and include:

- Santa Rosa Plain;
- Vernal Pool Preservation Plan;
- Laguna de Santa Rosa;
- Stemple Creek Enhancement Plan; and
- Sonoma Bay Trust Preservation Plan.

Table 2.3-1

Protected or Sensitive Biological Resources Potentially Impacted through Reservoir Construction and Maintenance

Protected or Sensitive Resource	Mitigation Ratios[1]			Target Habitat/Community
	Creation	Restoration	Preservation	
Oak Woodland/ Oak-Bay-Madrone Woodland[2]	1:1	1.5:1	2:1	Oak Woodland/ Oak-Bay Madrone Woodland[2]
Native Grassland[2]	1:1	2:1	3:1	Native Grassland[2]
Riparian Woodland/Coolwater B Stream[2]	1:1	2:1	3:1	Riparian Woodland/Coolwater A or B Stream/Red-legged Frog Habitat And NW Pond Turtle Habitat[2]
Riparian Woodland/Warmwater A Stream/Red-legged Frog Habitat And NW Pond Turtle Habitat[2]	1:1	2:1	3:1	Riparian Woodland/Warmwater A Stream/Red-legged Frog Habitat And NW Pond Turtle Habitat[2]
Non-wooded Riparian/Warmwater B Stream[2]	-	2:1	-	Riparian Woodland/Warmwater A Stream/Red-legged Frog Habitat And NW Pond Turtle Habitat[2]
Fresh Water Marsh[2]	1:1	2:1	3:1	Fresh Water Marsh[2]
Freshwater Ponds/Red-legged Frog And NW Pond Turtle Habitat[2]	1:1	2:1	3:1	Fresh Water Marsh/Red-legged Frog And NW Pond Turtle Habitat[2]
Freshwater Seep Wetlands Or Other Waters Of The U.S.[2]	-	2:1	3:1	Fresh Water Marsh[2]
Seasonally Wet Vegetation Wetlands	1:1	2:1	3:1	Seasonally Wet Vegetation Wetlands
Cropped Wetlands Or Other Waters Of The U.S.[2]	-	2:1	-	Seasonally Wet Vegetation Wetlands
Drainage Wetlands Or Other Waters Of The U.S.[2]	-	2:1	-	Riparian Woodland/Warmwater A Stream
Annual Grassland Wetlands Or Other Waters Of The U.S.[2]	-	2:1	-	Seasonally Wet Vegetation Wetlands
All other Wetlands Or Other Waters Of The U.S.[2]	-	2:1	-	Riparian Woodland/Warmwater A Stream

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:
1. Subject to change at the discretion of the U.S. Army Corps of Engineers.
2. Resource may contain Corps jurisdictional wetlands or other waters of the U.S.

Preconstruction Surveys

Following Project selection, but prior to construction of a reclamation alternative, qualified biologists shall verify and refine existing biological resource data and mapping associated with the proposed storage reservoir site(s) of the preferred Project. Survey protocols shall be developed through coordination with the appropriate managing and/or regulatory agency(ies). Sensitive biological resources and their associated managing/regulatory agencies are identified in Table 2.3-2. Functional evaluations shall be conducted for all potentially impacted jurisdictional wetlands.

Table 2.3-2

Sensitive Biological Resources and Managing Agency

Sensitive Resource	Managing/Responsible Agency
Oak woodland	CDFG, Sonoma and Marin Counties
Riparian woodland	CDFG
Native grassland	CDFG
Fresh water marsh	USFWS, CDFG, Corps
Aquatic stream and pond habitat	USFWS, CDFG, Corps
California red-legged frog habitat	USFWS, CDFG
Northwestern pond turtle habitat	CDFG
Other Corps jurisdictional wetlands and other waters of the U.S.	Corps, CDFG, USFWS

Source: Harland Bartholomew & Associates, 1996

Identification, Selection and Purchase of Mitigation Site(s)

The City of Santa Rosa shall compile a database of available mitigation opportunities and conduct feasibility studies to evaluate available properties for potential watershed enhancement and restoration. The following site attributes will be considered in the feasibility study:

1. High potential for long-term restoration success;
2. Biological resources of the mitigation site(s) currently or historically;
3. Adequate aerial extent; proximity to impact area;
4. Proximity to other restoration and/or preservation projects;

5. Availability through purchase of deed or long-term conservation easements; and

6. Achievable habitat diversity.

The City shall select mitigation sites in consultation with regulatory and trustee agencies considering the above criteria. To ensure long-term preservation of the restored and created resources, upon selection of the mitigation site(s), the City shall purchase suitable properties in deed or long-term conservation easements.

Following mitigation purchase, qualified professionals shall prepare a site specific Sensitive Resource Conservation Program. The conservation plan shall be based upon the principle of combining physical habitat construction or improvement with appropriate land management and planting in order to facilitate the rapid development of self-sustaining, naturalistic habitat complexes that will retain viability over the lifetime of the Project.

Selected sites will be surveyed to identify sensitive resources that should be considered in the Program including, but not limited to; protected species, sensitive habitats, and jurisdictional wetlands mentioned in this document. Impacts to these resources shall be avoided unless authorization is obtained through the appropriate agency.

The Conservation Program shall contain all elements necessary to ensure successful creation, restoration and preservation of the mitigation site(s) including, but not limited to, the following :

Description of the site, including the soil types, climate, hydrology and existing vegetation;

List of plant species to be used and a map showing where they will be planted;

Number and size of shrubs and trees to be planted;

Description of the extent and method of irrigation, if any;

Methods of propagation, seeding, etc. Specifications for site preparation and installation of plant materials;

Specifications and schedule for on-site care, including amount and application method of fertilizers (if necessary) and use of anti-herbivore netting;

Specifications for long-term plant care and monitoring, including guidelines for replacing plants that fail to establish during the monitoring period;

Long-term land management plan for the site including the limitations on grazing and other resources uses; and

Performance and monitoring criteria that specify a minimum of 80 percent survival rate that must be reached at the end of the first five-year period for the mitigation to be considered successful (subject to change at the discretion of the U.S. Army Corps of Engineers).

Habitat Construction

In some areas, particularly where streams have become excessively entrenched, wetland habitat creation or restoration may include grading in order to increase the frequency of flooding or to decrease the depth to seasonal soil saturation.

Planting

Except for some grass and forb seed that will be needed in quantity for slope stabilization and weed exclusion, plant material shall be limited to native species to the extent that they can be used in restoration, all material of woody and robust rhizomatous riparian species that can be readily transplanted, such as willows, bulrushes, and cattails, shall be salvaged from impact areas and used in restoration. To the extent called for in restoration plans, woody material (such as root wads) needed for stream restoration will also be derived from impact sites. Transplantation of other species shall be considered and addressed in the final restoration plans.

Other native plants will be established primarily from seed, either collected from impact sites or supplied commercially.

Land Management

No grazing shall be permitted in any mitigation areas during the initial five-year establishment period. Subsequently, short-season rest-rotation grazing (such as one to two months in the early season, every third year) may be permitted on a pasture-by-pasture basis, with utilization limited to no more than 15% of woody stems or "light" utilization of herbaceous vegetation.

Access shall be permitted for monitoring, scientific study, and passive recreational use.

Feasibility

Mitigation for unavoidable impacts to U.S. Army Corps of Engineers jurisdictional wetlands shall ultimately be authorized through the individual wetlands fill permit (Section 404, Clean Water Act). Mitigation for the loss of the federally proposed California red-legged frog will be authorized through the Section 7 (Endangered Species Act) consultation with the U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers.

There are a variety of opportunities for habitat and community creation, restoration and preservations in Sonoma and Marin counties. The current ecological conditions of each of the nine reservoir storage sites evaluated in the EIR/EIS provide opportunities for mitigation (Table 2.3-3). Other alternative mitigation opportunities are further

defined in the *Mitigation for Wetlands and Waters of the U.S. for Proposed Reservoir Sites* (Parsons Engineering Science, Inc. 1996b).

Impacts Mitigated and Mitigation Level:

Impacts Mitigated	Level of Significance After Mitigation
8.5.5 The storage reservoir component may cause loss of sensitive native terrestrial plant communities.	Alts 2 and 3 - Less than Significant
8.5.7 The discharge component may cause permanent loss of sensitive native terrestrial plant communities.	Alt 5a - Less than Significant
9.5.1 The storage reservoir component may cause loss of individuals or occupied habitat of federally listed, proposed, or candidate aquatic wildlife or plant species.	Alts 2a, 3a, 3b, 3d and 3e - Less than Significant
9.5.3 The storage reservoir component may cause loss of potential or occupied habitat of aquatic species of concern.	Alts 2a and 2c - Less than Significant
9.5.4 The storage reservoir component may cause permanent loss of sensitive aquatic plant communities and associated wildlife habitats.	Alts 3a - Less than Significant
9.5.5 The storage reservoir component may result in loss of aquatic habitat.	Alts 2 and 3a - Less than Significant
9.5.8 The storage reservoir component may cause a change in streamflows, affecting aquatic habitat or aquatic life downstream from proposed dam sites.	Alts 2, 3b, 3c, and 3d - Less than Significant
10.5.1 The storage reservoir component may destroy wetlands or other waters of the U.S.	Alts 2 and 3 - Less than Significant
10.9.1 The discharge component may destroy wetlands or other waters of the U.S.	Alt 5a - Less than Significant

Alternatives/Component: Alternatives 2, 3, and 5a

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Immediately following construction.

Complete: After five years or when performance criteria are met.

Monitoring Agency: City of Santa Rosa, California Department of Fish and Game, U.S. Fish and Wildlife Service, and U.S. Army Corps of Engineers

Table 2.3-3

Sensitive Biological Resources Identified at Storage Reservoir Sites

Storage Reservoir Site	Oak Woodland Habitat (acres)	Native Grassland (acres)	Mixed Riparian (acres)	Willow Riparian (acres)	Non-wooded Riparian (acres)	Red-legged Frog Habitat (acres)	Jurisdictional Wetlands (acres)	Cool-water Habitat (linear feet)	Warm-water Habitat A (linear feet)	Warm-water Habitat B (linear feet)	Pond (acres)
West County											
Bloomfield	0.6	0.0	1.0	8.7	13.6	2.7	57.4	0.0	0	14,500	1
Carroll Road	0.0	1.0	0.0	17.4	1.1	0.0	68.9	2700	3,400	6,900	3
Huntley	0.0	2.0	1.1	3.5	2.6	1.5	48.3	0	4,100	7,000	>1
Two Rock	58.3	1.3	8.3	7.4	3.0	8.7	61.8	350	6,000	7,700	3
Valley Ford	1.0	0.0	0.0	9.0	3.2	3.4	101.5	0	5,300	4,000	3
South County											
Adobe Road	16.9	0.0	60.2	0.0	3.9	0.0	30.3	0	0	7000	3
Lakeville Hillside	0.0	0.6	0.0	10.6	8.0	1.4	21.6	0	0	10,100	1
Sears Point	6.2	0.0	43.7	15.4	6.4	1.6	52.6	0	5,200	13,100	<1
Tolay Extended	0.0	25.0	4.4	2.4	19	4.8	247.6	0	1,850	27,300	1
Tolay Confined	0.0	23.9	4.4	2.6	18.9	4.8	86.9	0	1,850	12,500	1

Source: Harland Bartholomew & Associates, 1996

Validation: Monitoring shall be established primarily in terms of function and value criteria for jurisdictional waters and habitat goals for all other resources (as appropriate to the habitat types specified in the habitat creation and ecological restoration plans). Habitat goals shall be one element of the functional criteria for jurisdictional waters. In general, such goals are based upon percent aerial or basal cover and vigor of desired woody or herbaceous species rather than on survivorship of planted individuals. For most wetland mitigation habitat types, the success criterion for cover will be a minimum of 80% cover (subject to change at the discretion of the U.S. Army Corps of Engineers) within five years of habitat construction or restoration, however, lower overall cover criteria are appropriate for aquatic habitat incorporating some open water or for drainages that are characteristically partially unvegetated. Habitat criteria for oak woodland and other upland habitats will be primarily comparative, based upon monitoring of appropriate control plots in preserved habitats of those types. Vigor and plant diversity will be monitored but used primarily as a means of identifying appropriate improvements to habitat management or remedial actions for non-performing habitat, rather than as performance criteria.

Post-construction monitoring shall be conducted by a qualified restoration scientist annually for five years. Annual reports shall be submitted to California Department of Fish and Game, U.S. Fish and Wildlife Service, and U.S. Army Corps of Engineers. If mitigation appears to be failing at any time during the five-year monitoring period, the City will correct or replace the non-effective elements of the mitigation program.

The City shall review annual reports beginning with end of first growing season following construction. Conduct field monitoring on yearly basis or as deemed appropriate. Review annual reports and conduct monitoring annually for five years.

2.3.12 Provide Replacement Water Supply for Affected Wells

Description:

Prior to reservoir construction the City shall conduct a comprehensive well survey and hydrogeologic study at the selected reservoir site. This study shall include the following:

The City shall contact all property owners by mail and collect information about water sources and uses. A field check of all residential properties shall be conducted to accurately identify the location of all domestic wells. Detailed well location, well yield, and water source information shall be collected.

A qualified California Certified Hydrogeologist shall be retained to prepare a detailed, site-specific hydrogeologic investigation of the subbasin of the selected reservoir. This investigation shall serve to verify assumptions used in the groundwater impact evaluation, in Section 4.6 of this EIR/EIS, and to refine the location of the 20 percent or greater contribution zone.

The study shall include installation of an aquifer test well and a minimum of three observation wells located down gradient of the dam and upgradient of the nearest water supply well.

Upon completion of the aquifer tests, all wells shall be maintained as groundwater monitoring wells.

The City shall begin quarterly groundwater monitoring a minimum of one year prior to reservoir filling to establish baseline conditions. Nitrate concentrations shall be measured quarterly in all monitoring wells and compared with baseline measurements.

Should data from the monitoring wells indicate a substantial increase in nitrate levels or exceedence of the MCL of 10 mg/L (where background nitrate levels did not exceed MCLs) that would affect nearby private water supply wells, the City shall:

Develop and provide a replacement water supply for any affected drinking water uses within the 20 percent or greater contribution zone, and in any other areas where nitrate levels exceed the MCL. Replacement water would be provided by a water pipe that would originate at the Laguna Wastewater Treatment Plant. This pipe would be installed at the time of construction, and would occupy the same trench as the reclaimed water pipe from the treatment plant to the reservoir. Potable water pipelines from the reservoir to users would be installed in the same trench as the reclaimed water distribution lines serving irrigation areas. Pipes would be installed with adequate vertical and horizontal separation between potable water and reclaimed water lines to insure that the potable water would be protected. The number of users served, the volume of water replaced, and the size of the pipes shall be based on projected water quality impacts at individual wells

and approval of applicable zoning laws. Because the pipeline would be connected to the City's water supply, only City approval would be required for hook-ups. The City has an adequate water supply to ensure this measure is feasible.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
Impact 5.5.1 The storage reservoir component may degrade groundwater quality at existing wells, resulting in a public health hazard.	Alts 2 and 3 - Less than Significant
Impact 5.5.2 The storage reservoir component may degrade groundwater quality at future drinking water wells, resulting in a public health hazard.	Alts 2 and 3 - Less than Significant
Impact 7.5.1 The storage reservoir component may expose the public to chemicals, radionucliides, or pathogens at concentrations detrimental to human health..	Alts 2 and 3 - Less than Significant

Alternative/Component: Alternatives 2 and 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing:

Start: The City shall begin the well survey and hydrogeologic study at least one year prior to reservoir construction to establish baseline conditions. Quarterly groundwater sampling and nitrate analysis shall begin one year prior to filling of the reservoir.

Complete: Quarterly groundwater sampling and nitrate analysis shall continue throughout the life of the Project or until all drinking water supplies in affected area have been replaced.

Monitoring Agency: City of Santa Rosa

Validation: The City shall conduct an annual review of the groundwater monitoring program throughout the life of the Project unless all drinking water supplies in affected area have been replaced.

2.3.13 Monitor Groundwater Levels and Provide Replacement Water Supply

Description: The City shall monitor the water level of all groundwater wells screened in alluvium that are down gradient from the selected reservoir and within the subbasin. If access can not be obtained to monitor existing wells, then the City shall install several monitoring wells at the nearest upgradient location.

Should water level monitoring indicate that water supply wells may become unproductive as a result of reduced upgradient inflows (not because of seasonal drought conditions) the City shall provide a replacement water supply discussed under Measure 2.3.12.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Mitigation Level
Impact 5.5.1 The storage reservoir component may lower groundwater levels at existing wells.	Alts 2 and 3 - Less than Significant
Impact 5.5.2 The storage reservoir component may lower groundwater levels in areas that could have been developed for future water supply.	Alts 2 and 3 - Less than Significant

Alternative/Component: Alternatives 2 and 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Monitoring shall begin one year prior to filling the reservoir.

Complete: Monitoring shall be conducted annually until data indicates that wells would not be affected or when a replacement water supply has been provided for all affected wells.

Monitoring Agency: City of Santa Rosa

Validation: The City shall conduct an annual review of the groundwater monitoring program throughout the life of the Project, unless all drinking water supplies in affected area have been replaced.

2.3.14 Update Existing Hazardous Materials Management Plan

Description: The City of Santa Rosa Utilities Department shall amend the Laguna treatment plant's existing Hazardous Materials Management Plan (HMMP) to reflect the average annual increase in usage of liquid chlorine.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
7.2.2 The headworks expansion component may increase potential exposure of the public to hazardous materials due to chemical release.	Alts 2, 3, 4, and 5 - Less than Significant

Alternative/Component: Alternatives 2, 3, 4, and 5

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa Utilities Department

Timing: **Start:** Prior to operation of the proposed Project.

Complete: The HMMP shall be updated annually to reflect average annual use of liquid chlorine.

Monitoring Agency: City of Santa Rosa Fire Department

Validation: The Fire Department shall review the amended HMMP prior to operation of the proposed Project. Reviews shall be conducted annually, thereafter.

2.3.15 Construction Management Program

Description:

At the conclusion of the design phase, the City of Santa Rosa and the construction manager shall implement a Construction Management Program (Program). To avoid or minimize potential impacts to public health and safety, the Program shall include the following measures:

The Program shall indicate that excavations will be guarded by readily visible barricades, rails or other effective means to prevent access by the public.

The Program shall incorporate Standard Transportation Procedures, Measures 2.2.16 and 2.2.20 which require that local police, public works and fire departments for each jurisdiction (city, county and state) where construction is expected to occur, receive advance notification of construction activities. Local residents and businesses shall also be notified and access shall be maintained. Additionally, where encroachment permits are required (e.g., Caltrans and the Sonoma County Department of Public Works require such permits for work on roadways) this information would be provided as part of the encroachment permit application process.

Prior to construction the City shall hire a Registered Geologist to survey all pipeline alignments for contaminated soil, recording the location, extent, and type of contamination.

In the vicinity of hazardous materials/waste release sites, construction activities related to the Project that require excavation or exposure of soil shall be monitored by the contractor for subsurface contamination. Monitoring shall include, at minimum, visual observation by personnel with appropriate hazardous materials training, including 40 hours of Hazardous Waste Operations and Emergency Response (HAZWOPER) training.

In the vicinity of hazardous materials/waste release sites, groundwater brought to the surface as a result of construction dewatering shall be handled in a manner appropriate to the construction related permits for dewatering. If contamination is suspected or noted during the construction phase, then the groundwater shall be containerized and analyzed for contamination by a laboratory, certified by the California Environmental Protection Agency (CalEPA) Environmental Laboratory Accreditation Program (ELAP), using United States Environmental Protection Agency (USEPA)-approved analytical methods.

All potentially contaminated materials encountered during Project construction activities shall be evaluated in the context of applicable local, state and federal regulations and/or guidelines governing hazardous waste. All materials deemed to be hazardous shall be remediated and/or disposed of following applicable regulatory agency regulations and/or guidelines. Disposal sites for both remediated and non-remediated soils shall be identified prior to beginning construction. All evaluation, remediation, treatment and/or disposal of hazardous

waste shall be supervised and documented by qualified hazardous waste personnel.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
7.4.2 The pipeline component may be constructed on or within a known hazardous waste site.	Alt 2, 3, 4, and 5a - Less than Significant
7.6.2 The pump station component may be constructed on or within a known hazardous waste site.	Alts 2, 3, and 4 - Less than Significant
7.7.2 The agricultural irrigation component may expose workers or the public to hazards from a known hazardous waste site.	Alts 2 and 3 - Less than Significant
7.8.2 The geysers steamfield component may expose workers or the public to hazards from a known hazardous waste site.	Alt 4 - Less than Significant

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa and Construction Manager

Timing: **Start:** The Construction Management Program shall be developed at the conclusion of the design phase of the proposed Project. Monitoring to ensure implementation of the Program shall begin during the construction mobilization phase.

Complete: Monitoring shall continue throughout construction and cease at the completion of the construction phase.

Monitoring Agency: City of Santa Rosa and California Occupational Safety and Health Administration (Cal-OSHA)

Validation: The Construction Management Program shall be developed prior to construction. Cal-OSHA does not provide regular monitoring services, but may conduct periodic inspections.

2.3.16 Mosquito Prevention Program

Description:

The City shall prevent the creation of mosquito habitat in the storage reservoir. During design of the proposed Project, the City of Santa Rosa shall develop a Mosquito Prevention Program for the storage reservoir. The Program shall ensure that the storage reservoir is designed in a manner that minimizes favorable conditions for the development of potential mosquito habitat as described in the California Department of Health Services and the Marin/Sonoma Mosquito Abatement District's Criteria for Mosquito Prevention in Wastewater Reclamation or Disposal Projects. The criteria identify three general principles of mosquito control: (1) the manipulation of the physical features of the impoundment, (2) biological control, and (3) chemical control. Measures that shall be incorporated into the Program to meet these criteria include:

The storage reservoir may be of any shape but shall not have small coves or irregularities around its perimeter.

Side slopes shall be as steep as feasible, without jeopardizing slope stability.

The storage reservoir shall have an access ramp constructed on an inside slope for launching a small boat to conduct midge sampling and control.

The Program shall include a maintenance program for weeds and erosion control on the inner slopes of the reservoir.

The Program shall also include biological controls. One such control that may be utilized is stocking the reservoir with mosquito fish (*Gambusia affinis*). Mosquito fish feed on mosquito larvae and are the most common method of biological control.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
7.5.6 The storage reservoir component may increase the potential exposure of the public to disease vectors.	Alts 2 and 3 - Less than Significant

Alternative/Component: Alternatives 2 and 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** The Program shall be developed during the design phase. The City shall begin monitoring during construction of reservoirs for conformance to physical features of reservoir. The City shall monitor monthly when reservoirs are in use.

Complete: Throughout the life of the Project.

Monitoring Agency: City of Santa Rosa and Marin/Sonoma Mosquito Abatement District

Validation: The Marin/Sonoma Mosquito Abatement District shall review and approve the Program prior to the beginning of reservoir construction. The District shall review the City's Mosquito Management Program annually.

2.3.17 Pump Station Noise Control

Description:

The City shall retain a qualified noise engineer to assist in the final design of the pump stations. The noise engineer shall be responsible for ensuring that the following noise reduction measures are properly incorporated into the design of the pump stations:

Outdoor pump stations that exceed the noise criteria listed in Section 4.13, Noise, shall be designed to include noise barriers to reduce the noise at nearby sensitive receptors. The noise engineer shall ensure that the height and location of these noise barriers are adequate to reduce the noise at nearby sensitive receptors to a level that is within noise criteria established in Section 4.13. Noise barriers may be made of concrete, masonry, noise control panel, or earthberm. Noise barriers provide approximately 10 - 20 dBA noise reduction.

Pump stations that exceed the noise criteria in Section 4.13 by more than 30 dBA shall be designed to be housed in a fully enclosed underground facility. Detailed ventilation noise controls for the underground facility, such as louvers and silencer, shall also be incorporated into the final engineering design. Underground facilities provide approximately 20 - 30 dBA noise reduction.

The design of all pump stations shall be such that all openings, such as for ventilation and doors, shall face away from the sensitive receptors. This provides approximately 10 - 15 dBA noise reduction.

All exterior doors for the pump stations shall be constructed of metal assemblies which are weather-stripped to form an airtight seal when closed. Weather-stripped steel doors provide approximately 3 - 5 dBA noise reduction.

Acoustical louvers shall be used for the pump station housing air ventilation openings. Acoustical louvers provide approximately 5 - 7 dBA noise reduction. As an alternative to the acoustical louvers, the City may utilize an air intake/exhaust plenum ("L" shaped structure) as part of the final engineering design of the Project. This option would provide approximately 7 - 10 dBA noise reduction.

All pump stations shall utilize "low noise motors" for the pump systems. Low noise motors provide approximately 3 - 5 dBA noise reduction.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
13.6.2 Operation of the pump station component may expose the public to high noise levels.	Alts 2, 3, and 4 - Significant

Alternative/Component: Alternatives 2, 3, and 4

Lead Agency: City of Santa Rosa

Implementing Agency: Qualified Noise Engineer/City of Santa Rosa

Timing: **Start:** During final design of the proposed Project.

Complete: At the completion of final design.

Monitoring Agency: City of Santa Rosa

Validation: The City shall review final design plans to ensure all noise control measures have been incorporated.

2.3.18 Identification and Evaluation of Cultural Resources

Description:

Upon selection of a preferred alternative, the treatment of cultural resources to be affected by the Subregional System shall continue to be addressed under the Section 106 process of the National Historic Preservation Act. Consultation to address potential adverse effects will involve, at a minimum, the U. S. Army Corps of Engineers and the City of Santa Rosa (lead agencies) and the State Historic Preservation Officer (SHPO). If necessary, the Advisory Council on Historic Preservation (ACHP) and other parties, if appropriate, may be a part of this consultation process.

A Memorandum of Agreement (MOA) between these parties, executed pursuant to 36 CFR 800.6(c), will set out specific steps for avoiding or reducing harm to cultural resources formally determined eligible to the National Register of Historic Places. The MOA may provide for a phased resource identification, evaluation, and data recovery program.

Phase I - Field survey and study of associated access roads, pump stations, and/or pipelines depicted in the final design of the preferred alternative (elements not previously subject to field survey for the Project). These surveys and cultural resource identifications must be directed by qualified archaeologists/ historians/architectural historians who fulfill the Secretary of the Interior standards, as set forth in 36 CFR Part 1210, Appendix C. These identification studies must be conducted in a manner consistent with 36 CFR Part 1210, Appendix B, and with the recommendations of the SHPO.

Phase II - All prehistoric and historic resources that may be affected by implementation of the preferred alternative shall be evaluated for National Register significance before construction of the alternative may begin. Evaluation for National Register significance will be based on criteria A, B, C, and D, as presented in the Section 106 Guidelines, and the resources' overall integrity of location, setting, use, design, materials, workmanship, feeling, and association must be addressed.

Subsurface testing of a resource is often needed in order to answer questions about an archaeological site's eligibility for the National Register or to obtain data needed to make decisions about how to mitigate Project impacts on a site already determined eligible or placed on the Register. Testing is directed toward determining the site's boundaries, the depth of its deposits, and/or its basic nature and condition. Testing is completed when sufficient information has been gathered to make a determination of eligibility or a management decision (ACHP 1980). The MOA shall set forth guidelines for the testing and the subsequent development of a detailed data recovery work plan (research design).

Phase III - The MOA shall call for the development of a data recovery work plan (research design). This plan shall include the following (ACHP 1980):

- Specification of cultural resources to be studied within the impact area of the preferred alternative;
- Development of pertinent research questions;
- Establishment of study topics, springing from the research questions;
- Establishment of study priorities;
- Definition of data needs for each topic for study; and
- Description of methods to be employed in fieldwork and analysis. Architectural characteristics should be recorded consistent with the standards published by the National Architectural Engineering Record using Historic Architectural Engineering Records (HAER).

The MOA shall provide an opportunity for appropriate technical review of the data recovery work plan, usually by the SHPO, and, where needed, by the ACHP and peer review by outside parties.

Phase IV - The data recovery work plan shall be conducted by qualified personnel (36 CFR Part 1210, Appendix C) and shall meet contemporary professional standards, and the report shall be prepared in accordance with the format standards set forth in 36 CFR Part 1210, Appendix A. Provisions for curation of recovered specimens must be made at a permanent repository meeting the standards set forth in 36 CFR Section 1012.4(a)(1). Data recovery shall be completed prior to the beginning of construction

The MOA shall address the potential to disturb human remains as a result of Project construction. The disposition of Native American burials (human remains) is governed by the provisions of the California Public Resource Code (PRC) Sections 5097.94 and 5097.98, and fall within the jurisdiction of the Native American Heritage Commission. Where human remains are known, or thought likely to exist, consultation with the Native American Heritage Commission shall be initiated by the lead agencies as early in the Project planning process as possible. The Native American Heritage Commission has statutory authority to mediate agreements relative to the disposition of Native American remains. A burial agreement, addressing known burial locations and unidentified burials, shall be developed as part of the MOA prior to any archaeological excavation or ground-disturbing construction.

Additionally, the MOA shall provide for archaeological monitoring to guard against the discovery of unknown and/or buried resources. A qualified archaeologist who meets Secretary of the Interior standards shall conduct in-field monitoring during construction activities in areas of high archaeological sensitivity. In-field monitoring of unknown archaeological resources is discussed under Construction Mitigation Measure 2.4.12, Protect Undiscovered Cultural Resource sites.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
15.4.1 The pipeline component may cause	Alts 2, 3, 4, and 5a - Less than Significant

disturbance of potentially eligible National Register properties, including archaeological, historic, architectural, or Native American/traditional heritage resources.	
15.5.1 The storage reservoir component may cause disturbance of potentially eligible National Register properties, including archaeological, historic, architectural, or Native American/traditional heritage resources.	Alts 2 and 3 - Less than Significant
15.6.1 The pump station component may cause disturbance of potentially eligible National Register properties, including archaeological, historic, architectural, or Native American/traditional heritage resources.	Alts 2, 3, and 4 - Less than Significant
15.7.1 The agricultural irrigation component may cause disturbance of potentially eligible National Register properties, including archaeological, historic, architectural, or Native American/traditional heritage resources.	Alts 2 and 3 - Less than Significant
15.8.1 The geysers steamfield component may cause disturbance of potentially eligible National Register properties, including archaeological, historic, architectural, or Native American/traditional heritage resources.	Alt 4 - Less than Significant

Alternatives/Component: Alternatives 2, 3, 4, and 5a`

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Upon selection of a preferred alternative.

Complete: Before commencement of Project construction.

Monitoring Agency: City of Santa Rosa, U.S. Army Corps of Engineers, and State Historic Preservation Officer (SHPO)

Validation: The City shall not begin construction without concluding Section 106 Consultation with the State Historic Preservation Officer and U.S. Army Corps of Engineers.

2.4 CONSTRUCTION MEASURES

This section contains mitigation measures to be implemented prior to, during, and immediately following Project construction. These measures generally require the construction manager to follow certain constraints during construction and to repair and rehabilitate impacts resulting from construction of the Project. Compliance with these mitigation measures would result in minimizing, rectifying, or reducing adverse environmental impacts.

2.4.1 Removal of Aggregate Resources Prior to Construction

Description: Aggregate resources within the boundaries of the Adobe Road or Two Rock reservoir sites shall be removed to the extent possible and stockpiled outside the reservoir construction zone for use in construction of the reservoir, or other public or private construction projects. The purpose of the removal and stockpiling of the aggregate material is to make the resource available for future use. Aggregate not used in construction of the reservoir shall be moved to a "permanent" storage location within six months of completion of reservoir construction.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
1.5.3. The storage reservoir component may be an incompatible land use type in a designated quarry area.	Alt 2b - Less than Significant Alt 3a - Significant

Alternative/Component: Alternatives 2B and 3A

Lead Agency: City of Santa Rosa

Implementing Agency: Construction Manager/City of Santa Rosa

Timing: **Start:** At the commencement of reservoir construction.

Complete: Prior to completion of construction.

Monitoring Agency: City of Santa Rosa

Validation: This measure shall be completed prior to using the reservoir to store reclaimed water.

2.4.2 Remove Weak Surficial Deposits from Reservoir Footprint

Description.

During construction, the construction manager shall ensure that all weak surficial deposits, including all landslide deposits, unconsolidated alluvium and colluvium, and soil shall be excavated and removed from the borrow excavation area.

Slope stabilization measures identified in Measure 2.3.4 shall be incorporated into the borrow excavation plan for the reservoir sites to stabilize the reservoir to the extent feasible

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
3.5.1 The storage reservoir component may be located within an area of unstable slope conditions.	Alt 2 - Significant
3.5.7 The storage reservoir component may be exposed to damage due to expansive soils.	Alt 2 - Less than Significant

Alternative/Component: Alternative 2

Lead Agency: City of Santa Rosa

Implementing Agency: Construction Manager

Timing: **Start:** During construction of the storage reservoir.

Complete: At the completion of storage reservoir construction.

Monitoring Agency: City of Santa Rosa, Utilities Department

Validation: The City shall retain a Registered Geotechnical Engineer to verify compliance with this measure.

2.4.3 Standard Engineering Methods for Expansive Soils

Description:

Where the detailed pre-design soil analysis (Measure 2.3.6) has identified the presence of expansive soils, the following standard engineering methods shall be used to reduce or eliminate potential impacts from expansive soils:

Removal of native soil and replacement with an engineered fill material that is not prone to shrinking and swelling.

Soil stabilization, such as lime treatment to alter soil properties to reduce shrink-swell potential to an acceptable level.

Deepening footings or other support structures in the expansive soil to a depth where soil moisture fluctuation is minimized.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
3.4.7. The pipeline component could be exposed to damage due to expansive soils.	Alts 2, 3, and 4 - Less than Significant
3.5.7. The storage reservoir component may be exposed to damage due to expansive soils.	Alt 2 - Less than Significant
3.6.7. The pump station component may be exposed to damage due to expansive soils.	Alts 2, 3, and 4 - Less than Significant

Alternative/Component: Alternatives 2, 3, and 4

Lead Agency: City of Santa Rosa

Implementing Agency: Construction Manager

Timing: **Start:** During Project construction.

Complete: Upon completion of construction.

Monitoring Agency: City of Santa Rosa, Utilities Department

Validation: The City shall retain a Registered Geotechnical Engineer to verify compliance with this measure.

2.4.4 California Red-legged Frog Capture and Relocation Program

Description:

Preconstruction surveys by a qualified biologist (with current California Department of Fish and Game and United States Fish and Wildlife Service Scientific Collector's Permit) to locate and live-trap California red-legged frogs that may be destroyed due to construction of storage reservoirs and associated access roads and ancillary facilities.

A qualified biologist shall relocate and release the red-legged frogs in suitable habitat established in the conservation plan.

A qualified biologist shall monitor the relocated population of red-legged frogs on an annual basis for five years to determine the effectiveness of the mitigation program. The monitoring report should include data on extent and size of the population as well as some index of habitat quality. Annual reports shall be submitted to the City of Santa Rosa and the United States Fish and Wildlife Service (USFWS).

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
9.5.1 The storage reservoir component may cause loss of individuals or occupied habitat of endangered, threatened, or rare aquatic wildlife or plant species.	Alt 2, 3a, 3b, 3d, and 3e - Less than Significant (with Measure 2.3.11)

Alternatives/Component: Alternatives 2 and 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing

Start: Red-legged frog capture and relocation should occur during the active season (i.e., March-May; Mark Jennings, herpetologist, personal communication) prior to storage reservoir construction in the year of construction. First annual report should be submitted at the end of the year of storage reservoir construction.

Complete: Red-legged frog capture and relocation should be completed in March through May prior to storage reservoir construction in the year of construction. Measure will continue for a period of five years.

Monitoring Agency: City of Santa Rosa and U.S. Fish and Wildlife Service

Validation:

Review annual reports beginning with end of first growing season following construction. Conduct field monitoring on yearly basis or as deemed appropriate. Review annual reports and conduct monitoring annually for five years.

2.4.5 Active Raptor Nest Location and Monitoring Program

Description:

Construction of reservoir sites shall not result in the loss of active raptor nests. Preconstruction surveys (April or May) by a qualified wildlife biologist shall be conducted to locate and map all active raptor nests that are within or adjacent (i.e., within 0.25 miles) to proposed storage reservoir construction zone boundaries.

If active raptor nests are located within storage reservoir construction zone boundaries, then construction shall be delayed until the end of the nesting season (April-July) or until the young have fledged (i.e., have attained the power of flight). A qualified wildlife biologist shall monitor the nest to determine when the young have fledged and submit weekly reports to California Department of Fish and Game and the City of Santa Rosa throughout the nesting season.

If active raptor nests are located in the vicinity (i.e., within 0.25 miles) of storage reservoir sites, then a buffer zone shall be established by California Department of Fish and Game around the nest tree to minimize disturbance of the breeding birds. A qualified wildlife biologist shall monitor disturbance of the nesting raptors during construction of the storage reservoir and associated access roads and ancillary facilities.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
8.5.3 The storage reservoir component may cause loss of active raptor nest sites.	Alts 2 and 3 - Less than Significant

Alternatives/Component: Alternatives 2 and 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing

Start: During the raptor nesting season (i.e., April-July) of the year of construction. Prior to the onset of construction, active raptor nest surveys shall be conducted during April or May of the nesting season during the year of construction.

Complete: When all raptor young have fledged (usually by the end of July). If nests are located within or adjacent to the construction zone for proposed storage reservoirs, then monitoring will be complete when the last young raptor has fledged.

Monitoring Agency: City of Santa Rosa and California Department of Fish and Game

Validation:

Weekly reports will be submitted to California Department of Fish and Game and the City of Santa Rosa. If nest abandonment or early fledging of young is deemed likely, the biologist will contact the

construction manager, the City of Santa Rosa, and California Department of Fish and Game and construction will be stopped within the buffer zone until the young are fledged.

2.4.6 Screen Concrete Diversion Channels, Pump Stations and Other Facilities

Description: The City shall plant drought tolerant, non-invasive shrubs and trees and/or utilize raised berms at concrete diversion channels, pump stations and other facilities to screen views and reduce visual contrast in off-site foreground and middleground views.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
14.5.2 The storage reservoir component may be inconsistent with the Sonoma County or City General Plans regarding scenic landscape units.	Alt 2b - Significant
14.5.3 The storage reservoir component may be inconsistent with the Sonoma County or City General Plans regarding scenic corridors.	Alt 2, 3b, 3c, and 3d - Significant
14.5.5 The storage reservoir component may cause an adverse effect on foreground or middleground views from a high volume highway, recreation use area, or other public use area.	Alt 2d - Significant Alt 2b, 3b, and 3e - Less than Significant
14.5.6 The storage reservoir component may cause an adverse effect on foreground or middleground views from one or more private residences.	Alt 2, 3b, 3c, and 3d - Significant Alt 3e - Less than Significant
14.6.2 The pump station component may be inconsistent with the Sonoma County or City General Plans regarding scenic landscape units.	Alt 4 - Significant Alts 2 and 3 - Less than Significant
14.6.3 The pump station component may be inconsistent with the Sonoma County or City General Plans regarding scenic corridors.	Alts 2d and 4 - Significant Alts 2a, 2b, 2c and 3 - Less than Significant
14.6.4 The pump station component may inconsistent with minimum building setbacks for structures along Sonoma County designated scenic corridors.	Alts 2d and 4 - Significant Alts 2a, 2b, 2c and 3 - Less than Significant
14.6.5 The pump station component may cause an adverse effect on foreground or middleground views from a high volume highway, recreation use area, or other public use area.	Alt 4 - Significant Alts 2 and 3 - Less than Significant
14.6.6 The pump station component may cause an adverse effect on foreground or middleground views from one or more private residences.	Alts 2, 3, and 4 - Significant

Alternative/Component: Alternatives 2, 3, and 4

Lead Agency: City of Santa Rosa

Implementing Agency: Construction Manager

Timing: **Start:** During construction.

	Complete: Within one year of completing construction of a Project component.
Monitoring Agency:	City of Santa Rosa
Validation:	The City shall complete this measure within one year of completing construction of a Project component.

2.4.7 Establish Tree Screening

Description:

At the storage reservoir, trees shall be planted in a manner such that the points at which the face of dam joins the valley side slopes are screened and/or partially obscured from off-site foreground and middleground views.

Where reservoir sites may be viewed by residences, the City will coordinate with the affected landowner to provide vegetation screening on the residential property. Vegetation type and viewsheds to be screened shall be at the discretion of the landowner.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
14.5.2 The storage reservoir component may be inconsistent with the Sonoma County or City General Plans regarding scenic landscape units.	Alt 2b - Significant
14.5.3 The storage reservoir component may be inconsistent with the Sonoma County or City General Plans regarding scenic corridors.	Alt 2a, 3a, 3b, 3c, and 3d - Significant
14.5.5 The storage reservoir component may cause an adverse effect on foreground or middleground views from a high volume highway, recreation use area, or other public use area.	Alt 2d - Significant Alts 2b, 3b, and 3e - Less than Significant
14.5.6 The storage reservoir component may cause an adverse effect on foreground or middleground views from one or more private residences.	Alt 2a, 3a, 3b, 3c, and 3d - Significant Alt 3e - Less than Significant

Alternative/Component: Alternatives 2 and 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** During construction.

Complete: Within one year of completing construction of a Project component.

Monitoring Agency: City of Santa Rosa

Validation: The City shall complete this measure within one year of completing construction of a Project component.

2.4.8 Revegetate Face of the Reservoir Dam

Description: The face of the reservoir dam(s) shall be revegetated with drought tolerant, non-invasive grasses (and where appropriate natural groupings of shrubs in which the root systems will not interfere with the structural integrity of the dam) to reduce the visual contrast of the exposed soil and rock face compared to the grassy hillsides.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
14.5.2 The storage reservoir component may be inconsistent with the Sonoma County or City General Plans regarding scenic landscape units.	Alt 2b - Significant
14.5.3 The storage reservoir component may be inconsistent with the Sonoma County or City General Plans regarding scenic corridors.	Alt 2a, 3a, 3b, 3c, and 3d - Significant
14.5.5 The storage reservoir component may cause an adverse effect on foreground or middleground views from a high volume highway, recreation use area, or other public use area.	Alt 2d - Significant Alts 2b, 3b, and 3e - Less than Significant
14.5.6 The storage reservoir component may cause an adverse effect on foreground or middleground views from one or more private residences.	Alt 2a, 3a, 3b, 3c, and 3d - Significant Alt 3e - Less than Significant

Alternative/Component: Alternatives 2 and 3

Lead Agency: City of Santa Rosa

Implementing Agency: Construction Manager

Timing: **Start:** During construction.

Complete: Within one year of completing reservoir construction.

Monitoring Agency: City of Santa Rosa

Validation: The City shall complete this measure within one year of completing construction of a Project component.

2.4.9 Construction Noise Control Measures

Description:

The Construction Manager shall ensure that the following construction noise control measures are implemented in order to minimize noise disturbances at sensitive receptors during construction activities:

Newer equipment with improved noise muffling shall be used and all equipment items shall have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational.

All construction equipment shall be inspected weekly to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding, etc.).

Wherever possible hydraulic tools shall be used instead of pneumatic impact tools.

Construction activities after 7:00 p.m. or before 7:00 a.m. shall not be allowed within 2,000 feet of residential units, hotels, hospitals, or convalescent homes. Noise generating construction shall also be restricted within 1,600 feet of these facilities on Saturdays, Sundays, and holidays.

Heavy truck trips shall be routed over streets that will cause the least noise disturbance to residences or businesses in the vicinity of the Project site.

Construction staging areas, maintenance yards, and other construction oriented operations shall not be located within 1,600 feet of a sensitive receptor.

Where construction would occur within 1,600 feet of schools, the construction manager shall implement measures to insure that construction noise does not interfere with the learning activity of the students. The following noise control measures may be implemented:

Limit construction to non-school hours or weekends.

Utilize temporary noise barriers, as needed, to protect schools from excessive noise levels from construction activities. Noise barriers may be made of heavy plywood, vinyl curtain material, or natural and temporary earthberms.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
13.4.1. Construction of pipeline component may expose the public to high noise levels.	Alts 2, 3, 4, and 5a - Significant
13.4.3. Construction of pipeline component may cause high noise levels from construction traffic.	Alts 2, 3, 4, and 5a - Significant
13.5.1. Construction of storage reservoir component may expose the public to high noise levels.	Alts 2b, 2d, and 3e - Significant Alts 2a and 2c - Less than Significant
13.5.3. Construction of storage reservoir component may cause high noise levels from construction traffic.	Alts 2 and 3 - Significant
13.6.1. Construction of pump station component may expose the public to high noise levels.	Alts 2, 3, and 4 - Significant
13.7.1. Construction of the agricultural irrigation component may expose the public to high noise levels.	Alts 2 and 3 - Significant
16.4.2. The pipeline component may disrupt police, fire, schools, parks and recreation facilities, water, sewage treatment and disposal, or solid waste to such a degree that accepted service standards are not maintained..	Alts 2, 3, and 4 - Less than Significant

Alternative/Component:	Alternatives 2, 3, 4, and 5a
Lead Agency:	City of Santa Rosa
Implementing Agency:	Construction Manager/City of Santa Rosa
Timing:	**Start:** During Construction.
	Complete: At the completion of construction.
Monitoring Agency:	City of Santa Rosa
Validation:	The City will perform daily checks to ensure compliance with this measure. The City will respond to complaints from private citizens regarding construction noise within 24 hours.

2.4.10 Vehicle and Equipment Exhaust Control Program

Description:

The City of Santa shall require its contractors to implement mitigation measures to minimize the generation of exhaust emissions from construction vehicles and equipment. These measures consist of the following activities:

Construction vehicles and equipment shall be maintained and tuned at the interval recommended by the manufacturers to minimize exhaust emissions.

Equipment idling shall be kept to a minimum when equipment is not in use. No piece of unused equipment shall idle in one place for more than 30 minutes.

Construction truck trips for trucks using nearby roadways shall be scheduled during non-peak hours to reduce the amount of additional emissions that may be generated due to slower traffic on the affected roadways.

The distance of a trip to and from the construction site shall be kept to the shortest distance possible.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
12.4.1 The pipeline component may exceed emission threshold levels.	NOx emissions for Alts 2 and 3 - Less than Significant
12.5.1 The storage reservoir component may exceed emission threshold levels.	NOx emissions for Alts 2 and 3 - Significant SOx emissions for Alts 2b and 2d - Less than Significant CO emissions for Alts 2b and 2d - Significant
12.8.1 The geysers steamfield component may exceed emission threshold levels.	NOx emissions for Alt 4 - Significant

Alternative/Component: Alternatives 2, 3, and 4

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Upon commencement of the Project construction.

Complete: Upon completion of Project construction.

Monitoring Agency: City of Santa Rosa

Validation: The City of Santa Rosa will monitor the construction manager's compliance on a daily basis at the end of each work day.

2.4.11 Dust Control Program

Description:

The City of Santa Rosa shall require its contractors to implement measures to minimize the generation and transport of construction related fugitive dust. These measures consist of but are not limited to:

Soils exposed by clearing and grubbing, cutting and filling, or other operations, unpaved roads, and material storage piles shall be watered to control dust. Water shall be applied using water trucks or other means as often as necessary to keep surfaces damp. It is recommended that watering shall take place twice a day unless it rains more than one-tenth of an inch in a 24-hour period.

Surfaces that will be exposed for more than 5 working days shall treated with a chemical dust suppressant.

Clearing of surfaces shall be limited to the area that will be actively worked on.

All trucks transporting dust producing material leaving or entering the site shall be covered, and nearby roadways shall be cleaned regularly to reduce possible fugitive dust emissions outside of the construction area.

The speed of all construction vehicles shall not exceed 25 miles per hour on unpaved surfaces.

Exposed surfaces shall be paved or revegetated as soon as possible (refer to Measures 2.2.8 and 2.2.21).

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
12.4.1 Emissions generated during pipeline construction may exceed threshold levels.	Daily particulate for Alts 2 and 3 - Less than Significant Annual particulate for Alts 3 and 4 - Less than Significant Annual particulate for Alt 2 - Significant
12.5.1 Emissions generated during storage reservoir construction may exceed threshold levels.	Daily particulate for Alts 2 and 3 - Significant Annual particulate for Alts 2 and 3 - Significant

Alternative/Component: Alternatives 2, 3, and 4

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Upon commencement of Project construction.

Complete: Upon completion of Project construction.

Monitoring Agency: The City of Santa Rosa and the applicable air district for the construction area, either the Bay Area Air Quality Management District or the Northern Sonoma Air Pollution Control District.

Validation: The City of Santa Rosa will monitor the construction manager's compliance on a daily basis at the end of each work day.

2.4.12 Protect Undiscovered Cultural Resource Sites

Description:

The City shall retain an archaeological monitor to be present during certain phases of Project construction. The monitor shall be a qualified archaeologist who meets Secretary of the Interior standards and who shall conduct in-field monitoring during construction activities in areas of known resources and areas of high archaeological sensitivity. When the in-field monitor is not present, construction personnel should be made aware of indicators of cultural resources and shall report any encounters to the in-field monitor. In the event of late discoveries, work at the location should cease until the in-field monitor has evaluated the finds and situation and provided recommendations for further procedures.

If human remains are discovered, the county coroner must be notified within 48 hours (CEQA, Appendix K, Part VIII). There shall be no further disturbance to the site where the remains were found. If the remains are Native American, the coroner is responsible for contacting the Native American Heritage Commission within 24 hours. The commission, pursuant to Section 5097.98 of the PRC, shall immediately notify those persons it believes to be the most likely descendants of the deceased Native American. Treatment of the remains will be dependent of the views of the most-likely-descendent.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
15.4.2 The pipeline component may disturb unknown archaeological resources.	Alts 2, 3, 4, and 5a - Less than Significant
15.5.2 The storage reservoir component may disturb unknown archaeological resources.	Alts 2 and 3 - Less than Significant
15.6.2 The pump station component may disturb unknown archaeological resources.	Alts 2, 3, and 4 - Less than Significant
15.7.2. The agricultural irrigation component may disturb unknown archaeological resources.	Alts 2 and 3 - Less than Significant
15.8.2 The geysers steamfield component may disturb unknown archaeological resources.	Alt 4 - Less than Significant
15.9.2 The discharge component may disturb unknown archaeological resources.	Alt 5a - Less than Significant

Alternative/Component: Alternatives 2, 3, 4, and 5

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Commencement of Project construction.

Complete: Completion of Project construction.

Monitoring Agency: City of Santa Rosa, U.S. Army Corps of Engineers, and State Historic Preservation Officer (SHPO)

Validation: Completion of Project construction.

2.4.13 Protect Vertebrate Paleontologic Resources

Description:

The City of Santa Rosa shall identify a qualified professional paleontologist who will be on call during all phases of construction occurring in areas with a high potential for containing significant fossils. If fossils are unearthed in the course of construction excavation, the contractor shall cease all activity in the area and contact the City and the project paleontologist. The paleontologist will salvage the resource(s) and assess the necessity for further mitigation.

All recovered specimens shall be prepared and stabilized for preservation and shall be identified and cataloged into the retrievable collections of an established institution. Arrangements for adequate storage of specimens recovered during monitoring shall be made at a recognized, non-profit paleontologic specimen repository with a permanent curator. A complete set of field notes, geologic maps, and stratigraphic sections shall accompany the fossil collections. A report summarizing the monitoring and salvage programs shall be prepared by the project paleontologist and submitted to the lead agency and filed at the repository institution.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
15.4.3 The pipeline component may disturb unknown vertebrate paleontologic resources.	Alts 2, 3, 4, and 5a - Less than Significant
15.5.3 The storage reservoir component may disturb unknown vertebrate paleontologic resources.	Alts 2 and 3 - Less than Significant
15.6.3 The pump station component may disturb unknown vertebrate paleontologic resources.	Alts 2 and 3 - Less than Significant
15.7.3 The agricultural irrigation component may disturb unknown vertebrate paleontologic resources.	Alts 2 and 3 - Less than Significant
15.9.3 The discharge component may disturb unknown vertebrate paleontologic resources.	Alt 5a - Less than Significant

Alternative/Component: Alternatives 2, 3, 4, and 5a

Lead Agency: City of Santa Rosa

Implementing Agency: Project Paleontologist

Timing: **Start:** Commencement of Project construction.

Complete: Completion of Project construction.

Monitoring Agency: City of Santa Rosa

Validation: Completion of Project construction.

2.4.14 Coordinate Alternative Fire Response Service

Description: Where pipeline construction occurs immediately in front of a Fire Station and temporarily disrupts emergency response service, the City of Santa Rosa, with the construction manager, shall coordinate with the local Fire Departments to provide backup emergency response service. Coordination and notification shall be conducted in compliance with Measure 2.2.20.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
16.4.2. The pipeline component may disrupt police, fire, schools, parks and recreation facilities, water, sewage treatment and disposal, or solid waste to such a degree that accepted service standards are not maintained..	Alts 2, 3, and 4 - Less than Significant

Alternative/Component: Alternatives 2, 3, 4, and 5

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa/Construction Manager

Timing: **Start:** During pipeline construction.

Complete: Completion of pipeline construction.

Monitoring Agency: City of Santa Rosa

Validation: Completion of pipeline construction.

2.4.15 Sensitive Plant Relocation Program

Description: Seeds of hayfield tarplant or bristly linanthus, and Lobb's aquatic buttercup populations shall be collected and reestablished in mitigation sites developed as a result of the Sensitive Resource Conservation Program.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
8.2C. Cumulative projects impacts may cause loss of individuals of CNPS List 2, 3, or 4 plant species.	Alt 3 - Less than Significant

Alternative/Component: Alternative 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** During construction.

Complete: Completion of construction.

Monitoring Agency: City of Santa Rosa

Validation: This measure will be completed in conjunction with Measure 2.3.11, Sensitive Resource Conservation Program.

2.4.16 Ecological Risk Monitoring and Source Control Program

Description:

A monitoring plan shall be undertaken to collect additional toxicity data (Kelley Ponds, Russian River) over a two-year period. The data shall be used in an ecological risk assessment to determine if the existing system, the Project, and cumulative project discharges will result in an EQ exceeding 10 for great blue heron in the Laguna or for harbor seals in the Russian River. If it is determined that the EQ for great blue heron or harbor seals exceeds 10, then the City shall undertake a program to reduce the cumulative EQ for aluminum to less than 3.2. The risk assessment process utilizes assumptions about exposure, bioaccumulation, and toxicity. The process is intended to be step-wise, as potential impacts are identified with conservative assumptions. The standard risk assessment procedure involves reviews of assumptions and refinement of the analysis, as is described for this mitigation measure.

Aluminum in effluent is likely derived primarily from the addition of alum (aluminum sulfate) to enhance solids removal and disaffection. Options for reducing aluminum in effluent include substituting ferric chloride or an organic polymer for alum during treatment and identifying primary sources (aside from treatment) and implementing a control program.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
8.7C. Cumulative impacts may result in ecological risk to plant and wildlife populations.	Alt 5 - Less than Significant

Alternative/Component: Alternative 5

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** During pipeline construction.

Complete: Completion of pipeline construction.

Monitoring Agency: City of Santa Rosa

Validation: Completion of pipeline construction.

2.5 OPERATION AND MAINTENANCE MEASURES

This section contains mitigation measures to be implemented during operation of the proposed Project. These measures generally require monitoring of system operations over time and the modification of those operations to reduce adverse environmental impacts. Compliance with these measure would result in the reduction of adverse environmental impacts.

2.5.1 Pesticide Control Program

Description:

The City shall annually evaluate analytical developments for EPA-approved methods for acrolein, chlorpyrifos, demeton, guthion (azinphos-methyl), malathion, parathion, and toxaphene. Routine analytical detection limits provided by EPA-approved analytical methods are above the evaluation criteria for acrolein, chlorpyrifos, demeton, guthion (azinphos-methyl), malathion, parathion, and toxaphene, and therefore a definitive analysis of these constituents is not presently feasible. When new technologies or methodologies result in lowering the detection limits below the evaluation criterion, the City shall conduct a definitive analysis of these constituents. The analysis shall be conducted monthly in plant effluent.

If any three consecutive samples or annual average of any of these constituents are found to exceed water quality criteria, a source identification program shall be implemented by the City within 30 days. If any monitoring of these constituents in storage ponds shows that the concentration is lower than in plant effluent and the respective water quality criterion would not be exceeded as a result of discharge, then a source control identification program would not need to be implemented. These constituents are generally found in pesticides for home use. This identification control program shall include, at a minimum, investigation into the source(s) of the constituent. This would begin with potential commercial and industrial sources. If commercial and industrial sources do not fully account for the observed concentration, residential source(s) would be assumed and a public education program would be implemented. The public education program would be developed and implemented to alert the public to the sources of the problem constituents (e.g., brand names). The program could include print, video, or workshop media, and would contain information on proper application and disposal methods, and suggest alternatives to pesticides. Successful pesticide control programs are being implemented by Central Contra Costa Sanitary District, and the City and County of San Francisco (Water Pollution Prevention Program).

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
6.9.1 Acrolein, chlorpyrifos, demeton, guthion (azinphos-methyl), malathion, parathion, and toxaphene. The discharge scenarios may cause numeric-based criteria to be exceeded.	Design Discharge - Less than Significant

Alternative/Component: Direct Discharge Alternatives

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** The City shall begin their annual review of detection methodologies upon Certification of the EIR, and begin its monthly analysis within thirty days of a measurable drop in the detection limits. The source control program shall be implemented within 60 days of a third consecutive violation of the evaluation criteria.

Complete: These programs shall be ongoing.

Monitoring Agency: City of Santa Rosa and Regional Water Quality Control Board

Validation: The Board shall review City's compliance to this measure annually upon Certification of the EIR.

2.5.2 Control Program for Dissolved Copper Levels

Description:

The City shall initially limit design irrigation acreage to 4,500 acres in the Stemple watershed and begin monitoring for dissolved copper. Irrigation shall be limited to 360 acres in the subwatershed in which the Bloomfield reservoir is proposed. These acreage limitations are based on the estimated maximum acreage that may be irrigated without causing the dissolved copper point of significance to be exceeded. The City shall monitor streams in the Stemple and Americano watersheds monthly for dissolved copper and hardness. Adjustments may be made to the allowable design and contingency irrigation acreage depending on the monitoring results for dissolved copper concentration and receiving water hardness.

Significant impacts from dissolved copper in surface waters of West County have been identified as a potential impact of design and contingency (winter) irrigation. The finding of significance for copper was based on key assumptions about the concentration of copper in reclaimed water and the hardness of surface waters to which irrigation-affected groundwater would discharge.

The concentrations of dissolved copper in Americano and Stemple Creeks and their tributaries with irrigation were estimated using an average reclaimed water concentration of dissolved copper from 1991 through January 1995 (0.010 mg/L) (Merritt Smith Consulting 1996a). In September 1995, the Sonoma County Water Agency began balancing the pH in drinking water for the purposes of reducing corrosion in water supply pipes. Reducing corrosion of copper water supply pipes could reduce the concentration of dissolved copper in reclaimed water. The average concentration of copper in reclaimed water since September 1995 is 0.08 mg/L (n = 2 samples), indicating a potential long-term reduction in dissolved copper (Merritt Smith Consulting 1996a). Therefore, the concentration of dissolved copper in irrigation water may also be reduced.

The point of significance for copper increases as hardness increases. Based on pre-Project monitoring of West County streams, a hardness of 130 mg/L was used for our evaluation. This hardness yielded a point of significance for dissolved copper in West County streams of 14 µg/L. Thus, a monitoring program for copper and hardness will provide the basis for any adjustments of the allowable irrigation acreage.

The results of the pre-Project analysis of contingency (winter) irrigation impacts indicate that contingency irrigation would have a significant impact on dissolved copper in creeks throughout the Stemple and Americano irrigation areas in the dry season. Contingency irrigation is not expected to have a significant impact on dissolved copper during the wet season based on the pre-Project monitoring. Significance of contingency irrigation impact is very sensitive to the hardness and dissolved copper concentrations that result from irrigation. Therefore, mitigation is identified that allows contingency irrigation in the Stemple and Americano irrigation areas

only as indicated by data collected on the effects of design irrigation, as described in the following paragraph.

The City shall not contingency irrigate any lands in the Stemple or Americano irrigation areas prior to collection of dissolved copper and hardness data (in association with design irrigation specified above), and an evaluation of the data to calculate the appropriate contingency irrigation acreage to avoid significant impacts. Contingency irrigation of the indicated acreage could be initiated if the results of the evaluation indicate impacts on dissolved copper would be less than significant. Monitoring of contingency irrigation impacts shall be conducted to verify the impacts analysis that is based on the post-design irrigation monitoring data.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
6.7.1 Dissolved copper. The agricultural irrigation component may cause numeric-based criteria to be exceeded.	Alt 3 and Alt 3 Contingency - Less than Significant

Alternative/Component: West County and Contingency Irrigation

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Prior to any West County contingency irrigation.

Complete: Ongoing until RWQCB determines that hardness has been adequately characterized and copper exceedences are avoided.

Monitoring Agency: City of Santa Rosa and Regional Water Quality Control Board

Validation: This measure shall be ongoing until RWQCB determines that hardness has been adequately characterized and copper exceedences are avoided.

2.5.3 Control Program for Hydrogen Sulfide, Ammonia, and Dissolved Oxygen

Description:

The City shall implement a Monitoring and Control Program to ensure that reservoir seepage potentially contaminated with elevated levels of hydrogen sulfide and ammonia, and reduced dissolved oxygen levels do not reach surface waters immediately downstream of the reservoirs.

The City shall monitor the storage reservoir(s) monthly for stratified conditions by measuring the vertical temperature profile of the reservoir. If stratification is observed, water samples from the lower layer of the reservoir shall be collected immediately and monthly thereafter. These samples shall be analyzed for hydrogen sulfide, ammonia, and dissolved oxygen.

The City shall also collect surface water samples and shallow groundwater samples downstream of the reservoir(s). These samples shall be collected monthly and analyzed for hydrogen sulfide, ammonia, pH, total dissolved solids, and dissolved oxygen. Monitoring for pH and total dissolved solids will allow determination of un-ionized ammonia, the toxic form of ammonia.

If monitoring indicates that evaluation criteria are exceeded for any of the constituents, the City shall implement the following measure to ensure that contaminated seepage is not reaching surface waters:

> The City shall install a system of wells between the reservoir(s) and downstream receiving waters that will be operated to intercept shallow groundwater seeping from the storage site. Intercepted groundwater will be returned to the storage reservoir. This measure could increase groundwater depletion below the reservoir, but mitigation for this impact is already included in Measure 2.3.13.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
6.5.1 Hydrogen sulfide. The storage reservoir component may cause numeric-based criteria to be exceeded.	Alts 2a, 2c, 2d, and 3 - Less than Significant
6.5.1 Ammonia. The storage reservoir component may cause numeric-based criteria to be exceeded.	Alts 2a, 2c, 2d, and 3 - Less than Significant
6.5.1 Dissolved oxygen. The storage reservoir component may cause numeric-based criteria to be exceeded.	Alts 2a, 2c, 2d, and 3 - Less than Significant

Alternative/Component: Alternatives 2 and 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Immediately after reservoir(s) receive reclaimed water.

Complete: Ongoing until RWQCB determines that reservoir and downstream conditions have been adequately characterized relative to hydrogen sulfide, ammonia, and dissolved oxygen.

Monitoring Agency: City of Santa Rosa and Regional Water Quality Control Board

Validation: This measure shall be ongoing until RWQCB determines that reservoir and downstream conditions have been adequately characterized relative to hydrogen sulfide, ammonia, and dissolved oxygen.

2.5.4 Discharge Operations

Description:

The City shall revise discharge operations to reduce the effects of reclaimed water on waterways. The Mitigation Discharge Operating Scenario is defined by the monthly storage objective in Table 2.5-1 and emphasizes winter discharge and reduced fall and spring discharge. The monthly storage objectives shall be used as the basis for managing discharge associated with a 20 percent design discharge (Laguna or River) and geysers discharge component. In addition, discharge at Meadowlane Pond and other locations shall be minimized in favor of discharge at Delta Pond consistent with assumptions about operations upon which the impacts assessment was based.

Table 2.5-1

Monthly Storage Objectives for Mitigation of Design Discharge Impacts[a]

	20 Percent		Geysers	
	Project Operations[b]	Mitigation Operations[c]	Project Operations[b]	Mitigation Operations[c]
1 November	311	774	92	92
1 December	444	1079	98	98
1 January	552	839	191	200
1 February	635	600	498	350
1 March	767	360	679	500
1 April	972	120	1045	800
1 May	1139	825	1203	1150
15 May	1200	1200	1184	1184

Source: *Water Balance Summary and Model - Overall Results* (based on latest estimate of ADWF), (Parsons Engineering Science, Inc. 1996c) and *Russian River Water Quality Monitoring Results*, (Merritt Smith Consulting 1996d)

[a] units = million gallons
[b] Monthly storage objectives implicit in the Project description
[c] Monthly storage objective for mitigation operations

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
6.9.2 Algal Growth. Discharge scenarios may cause narrative-based criteria to be exceeded.	All alternatives - Significant
6.9.2-Turbidity. Discharge scenarios may cause narrative -based criteria to be exceeded.	Alt 5a Design Discharge - Less than Significant Alt 5 Contingency Discharge - Significant

Alternative/Component: All Alternatives

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Prior to Project-related reclaimed water discharges.

Complete: Ongoing.

Monitoring Agency: City of Santa Rosa and Regional Water Quality Control Board

Validation: Compliance with this measure shall be required prior to Project-related reclaimed water discharges.

2.5.5 Cyanide Monitoring and Source Control Program

Description:

The City shall implement a Cyanide Monitoring and Source Control Program to verify that the concentration of cyanide in storage ponds will not cause a significant impact if discharged and, if necessary, identify and control the source of cyanide as needed to avoid exceeding the cyanide point of significance in receiving waters.

The concentration of cyanide in plant effluent exceeds the point of significance for cyanide and, if discharged directly, would cause significant impacts to the Laguna and Santa Rosa Creek. However, reclaimed water is typically stored prior to discharge. Existing data from reclaimed water storage ponds (Delta and Meadowlane Ponds) indicate that, with storage, cyanide volatilizes and/or complexes with other compounds. The total cyanide concentration in stored reclaimed water was below detection and less than the point of significance for cyanide. Thus, monitoring may show that the cyanide concentration in pond discharge would not cause the point of significance to be exceeded, in which case source identification and reduction would be unnecessary.

The City shall implement a cyanide monitoring program to verify that the concentration of cyanide in storage ponds will not cause a significant impact if discharged. The concentration below which no impact will occur will be determined for the selected discharge alternative according to the methods for conservative constituents described in the *Water Quality Impacts Analysis* Technical Report (Merritt Smith Consulting 1996b). Monitoring shall be done on a bi-weekly basis in Delta and Meadowlane Ponds.

If the concentration of total cyanide in a storage pond exceeds the concentration determined to cause a significant impact for three consecutive samples or if the annual average total cyanide concentration in a storage pond exceeds the concentration determined to cause a significant impact, the City shall implement a cyanide source control program. Typical cyanide sources include processes such as metal-cleaning and electro-plating baths, gas scrubbers, gas works, coke ovens, and other chemical treatments.

The program shall include, at a minimum, the following:

Identification of industrial facilities that use cyanide and discharge to the City sewer system.

Sampling of the quality of wastewater produced by any such facilities.

Development and enforcement of limits for industrial dischargers of cyanide as needed to avoid exceeding the cyanide point of significance in receiving waters.

The cyanide source identification and control process shall be consistent with EPA pretreatment program guidance and regulations.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
6.9.1 Cyanide. Discharge scenarios may cause numeric-based criteria to be exceeded.	Alt 5b Design Discharge - Less than Significant Alt 5b Contingency Discharge - Less than Significant

Alternative/Component: Discharge and 20 percent design and contingency discharge to the Laguna components

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** The City is currently monitoring for cyanide. The source control plan will be implemented immediately when exceedences are discovered.

Complete: Ongoing.

Monitoring Agency: City of Santa Rosa and Regional Water Quality Control Board

Validation: The City will continue monitoring for cyanide throughout the life of the Project. The source control plan will be implemented immediately when exceedences are discovered.

2.5.6 Total and Ammonia Nitrogen Source Control Program

Description:

The Subregional System members shall implement a Total and Ammonia Nitrogen Source Control Program.

The Program shall reduce the annual total nitrogen load to the Laguna by 159,000 pounds/year (a reduction from the current load of 424,700 pounds/year), and the annual ammonia nitrogen load to the Laguna by 21,500 pounds/year (a reduction from the current load of 56,610 pounds/year). See Tables 4-23 and 4-24 in the *Water Quality Impact Analysis Report* (Merritt Smith Consulting 1996b) for summaries of the load reduction goals for the Laguna.

The Program shall consist of implementing specific control measures which may include:

> Manure management practices such as: separating clean rainfall runoff from water contaminated with manure, containing solids and waste liquids, and fencing waterways (Gold Ridge 1995). Additional practices considered feasible are described in the *Irrigation Management Guidelines* Technical Memorandum (Questa 1996).
>
> Control of specific non-Subregional System sources such as: urban stormwater runoff, septic systems, and agricultural runoff (RWQCB 1995).

To the extent that additional load reduction is needed beyond that which can be achieved at non-Subregional System sources, total and ammonia load reduction may be implemented at the Laguna treatment plant, or in wetlands constructed or restored for the purpose of ammonia and total nitrogen removal. Nitrogen removal in the treatment plant to a final reclaimed water concentration of approximately 7 mg-N/L without any control of non-Subregional System sources would meet the load reduction requirement. This level of removal is considered feasible based on engineering analysis of the Laguna treatment plant (CH2M HILL 1995). The feasibility of ammonia and total nitrogen removal is documented in *the Treatment Wetlands Evaluation* Technical Report (Merritt Smith Consulting 1996c).

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
6.9.2- Total Nitrogen Waste Reduction Strategy. Discharge scenarios may cause narrative-based criteria to be exceeded.	Design Discharge - Less than Significant
6.9.2- Ammonia Nitrogen Waste Reduction Strategy. Discharge scenarios may cause narrative-based criteria to be exceeded.	Design Discharge - Less than Significant

Alternative/Component: Alternative 5b

Lead Agency:	City of Santa Rosa
Implementing Agency:	City of Santa Rosa
Timing:	**Start:** Prior to Project-related reclaimed water discharges.
	Complete: Ongoing, as long as the Waste Reduction Strategies in the Laguna are exceeded.
Monitoring Agency:	City of Santa Rosa and Regional Water Quality Control Board
Validation:	Compliance with this measure shall be required prior to Project-related reclaimed water discharges.

2.5.7 Toxicity Control Program

Description:

The City shall implement a Toxicity Control Program. This program shall consist of increased monitoring, toxicity identification and reduction and is recommended regardless of which alternative is implemented. The Subregional System is currently required to monitor for chronic toxicity quarterly during the discharge season. At such time that lethal toxicity is observed in reclaimed water, the City shall increase sampling frequency to biweekly (every two weeks) until three tests have been conducted (the original quarterly test plus two biweekly tests). Tests shall be conducted as described in EPA (1991a), or as otherwise ordered by the Regional Board.

If lethal toxicity is observed consistently in the three samples, then a toxicity identification evaluation (as described in EPA 1991b, EPA 1993a, b) shall be conducted. The purpose of the toxicity identification evaluation is to identify the reclaimed water constituent(s) that are causing the toxicity. The reason that a toxicity identification evaluation is not appropriate after the first observation of lethal toxicity is that evaluation success is dependent on the presence of lethal toxicity. After the toxicity identification evaluation provides conclusive evidence of the toxic constituent(s), then sources of the constituent(s) shall be identified and controlled by a toxicity reduction evaluation (as described in EPA 1989a) so that lethal toxicity is not observed in reclaimed water.

The toxicity identification evaluation/toxicity reduction evaluation process has been documented to successfully identify and control toxicity-causing constituents in effluents exhibiting consistent toxicity (EPA 1989a, EPA 1991b, EPA 1993a, b). Therefore, this mitigation measure is considered to be effective.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
6.9.2-Toxicity (lethal effects). Discharge scenarios may cause the narrative-based criteria to be exceeded.	Design Discharge - Less than Significant Contingency Discharge - Less than Significant

Alternative/Component: Alternative 5b

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Prior to Project-related reclaimed water discharges.

Complete: Ongoing.

Monitoring Agency: City of Santa Rosa and Regional Water Quality Control Board

Validation: Compliance with this measure shall be required prior to Project-related reclaimed water discharges.

2.5.8 Monitor Seismic Events and Adjust Injection Rates

Description:

Before injection of reclaimed water to the geysers steamfield begins, the local seismographic station network maintained by the geysers operators (Unocal-NEC-Thermal) shall be upgraded to focus instrumental coverage around the wells proposed for injection. Accelerograph stations shall be added in Cobb and Anderson Springs to allow operators to determine relationships between seismic events within the geysers steamfield and felt effects in nearby communities. Software shall be improved to enable routine automated locating and mapping of epicenters of seismic events and analysis of data.

The geysers operators shall analyze this data and determine which injection wells are more susceptible to felt induced seismicity. Injection shall be decreased at wells that produced higher levels of induced seismicity and more water shall be shunted to other well sites that produce fewer seismic events. The total volume of water injected shall remain the same.

Quarterly reports shall be prepared by the geysers operators and submitted to the City. Reports shall include plots of daily volumes of injection at each well, tables and plots of seismicity located within an agreed control radius of the well (e.g. 1 km), and planned operational responses. Success of redistribution of water and any other modifications in operations in reducing felt seismic events shall be continually evaluated so that the program can be fine tuned.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
3.8.4 The geysers steamfield component may induce seismicity.	Alt 4 - Less than Significant.

Alternative/Component: Alternative 4

Lead Agency: City of Santa Rosa

Implementing Agency: Geysers Operators

Timing:

Start: The improvements to the monitoring network and the implementation of reporting forms for local residents shall be implemented before injection of reclaimed water begins.

Complete: Monitoring and adjustment of operations shall continue throughout the life of the Project

Monitoring Agency:

The City of Santa Rosa will monitor operations. The City may retain an independent expert to evaluate the significance of the reported effects in the community and compare them to the findings of the quarterly injections operations and seismological monitoring reports.

Validation: Quarterly reports shall be prepared by the geysers operators and submitted to the City. Quarterly reports shall be available for public review at the City of Santa Rosa.

2.5.9 Implement Septic System Monitoring and Replacement Program

Description: The City shall coordinate with the Sonoma County Environmental Health Department to monitor septic systems located down gradient of the selected reservoir site. If monitoring indicates that reservoir construction has adversely affected septic system operation or environmental health and safety, then systems shall be replaced with non-conventional systems, such as a mound system, that can operate effectively in shallow groundwater conditions.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
5.5.3 The storage reservoir component may cause groundwater mounding or increase groundwater levels that cause surface discharge in a non-stream environment.	Alt 3 - Less than Significant

Alternative/Component: Alternative 3

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** Prior to construction of reservoir.

Complete: Ongoing, throughout the life of the Project.

Monitoring Agency: City of Santa Rosa and Sonoma County Environmental Health Department.

Validation: Monitoring shall be conducted quarterly throughout the life of the Project.

2.5.10 Discharge Prohibition During Flood Stage

Description: The Subregional System shall not discharge when the water surface elevation at the Hacienda gage is greater than 31 feet (one foot less than the flood stage).

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
4.4C. Cumulative discharge impacts may cause flooding in the Russian River and the Laguna.	All Alts - Less than Significant

Alternative/Component: All Alternatives

Lead Agency: City of Santa Rosa

Implementing Agency: City of Santa Rosa

Timing: **Start:** At Project startup.

Complete: Ongoing, throughout the life of the Project.

Monitoring Agency: City of Santa Rosa

Validation: The City shall maintain daily records of operations and river flow.

2.6 SUMMARY OF MITIGATION MEASURES BY ALTERNATIVE

Table 2.6-1 provides a summary of the mitigation measures to be implemented for each alternative.

Table 2.6-1

Summary of Mitigation Measures by Alternative

Mitigation Measure	Alternative											
	2a	2b	2c	2d	3a	3b	3c	3d	3e	4	5a	5b
2.2 Measures Included in the Project												
2.2.1 Irrigation Conservation and Management Programs	X	X	X	X	X	X	X	X	X			
2.2.2 Irrigation Site Resource Maps	X	X	X	X	X	X	X	X	X			
2.2.3 Restrict Surface and Subsurface Irrigation Water Runoff	X	X	X	X	X	X	X	X	X			
2.2.4 Restrict Soil Erosion and Sediment Movement	X	X	X	X	X	X	X	X	X			
2.2.5 Avoid Sensitive Biological Resources	X	X	X	X	X	X	X	X	X	X	X	
2.2.6 Agrochemical and Fertilizer Best Management Practices	X	X	X	X	X	X	X	X	X			
2.2.7 Prohibit Creation of Mosquito Habitat	X	X	X	X	X	X	X	X	X			
2.2.8 Revegetate Temporarily Disturbed Sites	X	X	X	X	X	X	X	X	X	X	X	
2.2.9 Retain Stripped Topsoil	X	X	X	X	X	X	X	X	X	X	X	
2.2.10 Storm Water Pollution Prevention Plan	X	X	X	X	X	X	X	X	X	X	X	
2.2.11 Protect Creeks from Toxic Discharge	X	X	X	X	X	X	X	X	X	X	X	
2.2.12 Concrete Waste Management	X	X	X	X	X	X	X	X	X	X	X	
2.2.13 Pipeline Features in Active Fault Zones										X		
2.2.14 Dam Safety	X	X	X	X	X	X	X	X	X			
2.2.15 Standard Traffic Control Procedures	X	X	X	X	X	X	X	X	X	X	X	

Table 2.6-1

Summary of Mitigation Measures by Alternative

Mitigation Measure	Alternative											
	2a	2b	2c	2d	3a	3b	3c	3d	3e	4	5a	5b
2.2.16 Emergency Response Vehicles Will Not be Impeded	X	X	X	X	X	X	X	X	X	X	X	
2.2.17 Maintain Maximum Number of Open Lanes on Roadways	X	X	X	X	X	X	X	X	X	X	X	
2.2.18 Jack and Bore Construction at Major Highways	X	X	X	X	X	X	X	X	X	X	X	
2.2.19 Fence or Cover Trenches	X	X	X	X	X	X	X	X	X	X	X	
2.2.20 Access to Businesses and Residences	X	X	X	X	X	X	X	X	X	X	X	
2.2.21 Repair Road Damage	X	X	X	X	X	X	X	X	X	X	X	
2.2.22 Park Within Construction Easements	X	X	X	X	X	X	X	X	X	X	X	
2.2.23 Limit Delivery Hours	X										X	
2.2.24 Limit Ingress/Egress of Construction Equipment	X	X	X	X	X	X	X	X	X	X	X	
2.2.25 Minimize/Reduce Fossil Fuel Consumption	X	X	X	X	X	X	X	X	X	X	X	
2.2.26 Odor Control for Sludge Handling	X	X	X	X	X	X	X	X	X	X	X	X
2.2.27 Uniform Relocation Assistance	X	X	X	X	X	X	X	X	X			
2.3 Planning Measures												
2.3.1 Replacement of Open Space Easements										X		
2.3.2 Restrict Approval of Agricultural Irrigation Contracts	X	X	X	X	X	X	X	X	X			
2.3.3 Agricultural Irrigation Demonstration Programs	X	X	X	X	X	X	X	X	X			
2.3.4 Slope Stabilization Design	X	X	X	X	X	X	X	X	X	X		
2.3.5 Liquefaction Stabilization Design	X	X	X	X	X	X	X	X	X	X	X	

Table 2.6-1

Summary of Mitigation Measures by Alternative

Mitigation Measure	Alternative											
	2a	2b	2c	2d	3a	3b	3c	3d	3e	4	5a	5b
2.3.6 Standard Engineering Methods for Corrosive Soils	X	X	X	X	X	X	X	X	X			
2.3.7 Slope Monitoring and Response System	X	X	X	X	X	X	X	X	X	X		
2.3.8 Earthquake Preparedness and Emergency Response Program	X	X	X	X	X	X	X	X	X	X		
2.3.9 Adjust Pipeline Alignments	X	X	X	X	X	X	X	X	X	X	X	
2.3.10 Limit Construction Disturbance	X	X	X	X	X	X	X	X	X	X	X	
2.3.11 Sensitive Resource Conservation Program	X	X	X	X	X	X	X	X	X		X	
2.3.12 Provide Replacement Water Supply for Affected Wells	X	X	X	X	X	X	X	X	X			
2.3.13 Monitor Groundwater Levels and Provide Replacement Water Supply	X	X	X	X	X	X	X	X	X			
2.3.14 Update Existing Hazardous Materials Management Plan	X	X	X	X	X	X	X	X	X	X	X	X
2.3.15 Construction Management Program	X	X	X	X	X	X	X	X	X	X	X	
2.3.16 Mosquito Prevention Program	X	X	X	X	X	X	X	X	X			
2.3.17 Pump Station Noise Control	X	X	X	X	X	X	X	X	X	X		
2.3.18 Identification and Evaluation of Cultural Resources	X	X	X	X	X	X	X	X	X	X	X	
2.4 Construction Measures												
2.4.1 Removal of Aggregate Resources Prior to Construction		X			X							

Table 2.6-1

Summary of Mitigation Measures by Alternative

Mitigation Measure	Alternative											
	2a	2b	2c	2d	3a	3b	3c	3d	3e	4	5a	5b
2.4.2 Remove Weak Surficial Deposits from Reservoir Footprint	X	X	X	X								
2.4.3 Standard Engineering Methods for Expansive Soils	X	X	X	X	X	X	X	X	X	X		
2.4.4 California Red-legged Frog Capture and Relocation Program	X	X	X	X	X	X		X	X			
2.4.5 Active Raptor Nest Location and Monitoring Program	X	X	X	X	X	X	X	X	X			
2.4.6 Screen Concrete Diversion Channels, Pump Stations and Other Facilities	X	X	X	X	X	X	X	X	X	X		
2.4.7 Establish Tree Screening	X	X		X	X	X	X	X	X			
2.4.8 Revegetate Face of the Reservoir Dam	X	X		X	X	X	X	X	X			
2.4.9 Construction Noise Control Measures	X	X	X	X	X	X	X	X	X	X	X	
2.4.10 Vehicle and Equipment Exhaust Control Program	X	X	X	X	X	X	X	X	X	X		
2.4.11 Dust Control Program	X	X	X	X	X	X	X	X	X	X		
2.4.12 Protect Undiscovered Cultural Resource Sites	X	X	X	X	X	X	X	X	X	X	X	
2.4.13 Protect Vertebrate Paleontologic Resources	X	X	X	X	X	X	X	X	X	X	X	
2.4.14 Coordinate Alternative Fire Response Service	X	X	X	X	X	X	X	X	X	X		
2.4.15 Sensitive Plant Relocation Program					X	X	X	X	X			
2.4.16 Ecological Risk Monitoring and Source Control Program											X	X

Table 2.6-1

Summary of Mitigation Measures by Alternative

Mitigation Measure	Alternative											
	2a	2b	2c	2d	3a	3b	3c	3d	3e	4	5a	5b
2.5 Operation and Maintenance Measures												
2.5.1 Pesticides Control Program											X	X
2.5.2 Control Program for Dissolved Copper Levels					X	X	X	X	X			
2.5.3 Control Program for Hydrogen Sulfide, Ammonia, and Dissolved Oxygen	X		X	X	X	X	X	X	X			
2.5.4 Discharge Operations	X	X	X	X	X	X	X	X	X	X	X	X
2.5.5 Cyanide Monitoring and Source Control Program												X
2.5.6 Total and Ammonia Nitrogen Source Control Program												X
2.5.7 Toxicity Control Program												X
2.5.8 Monitor Seismic Events and Adjust Injection Rates										X		
2.5.9 Implement Septic System Monitoring and Replacement Program					X	X	X	X	X			
2.5.10 Discharge Prohibition During Flood Stage	X	X	X	X	X	X	X	X	X	X	X	X

Source: Harland Bartholomew and Associates, Inc. 1996

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3 DESCRIPTION OF EXISTING SYSTEM AND ALTERNATIVES (PROJECT DESCRIPTION)

This chapter is organized into six sections:

- **Section 3.1 Project Location and Description of Alternatives** identifies the geographic location of the Project area in relation to governmental jurisdictions and major man-made and natural features. It also identifies the Project components which make up each of the five alternatives and describes subalternatives that are evaluated in this EIR/EIS. This section describes the process by which the Project alternatives were developed and evaluated, leading to the selection of the five Project alternatives which are the subject of this EIR/EIS. Finally, this section identifies alternatives which were considered and not carried forward as one of the selected Project alternatives.

- **Section 3.2 Existing System with Interim Improvements** describes the existing Subregional System, including the interim improvements completed in 1995 and 1996. This section also provides a background for understanding the other Project alternatives.

- **Section 3.3 Description of Project Components** describes the location and scope of individual Project components, including reuse, discharge, and storage components, included in the Project alternatives.

- **Section 3.4 Cost of Alternatives** identifies the estimated construction costs and the costs of operation and maintenance activities for the Project alternatives.

- **Section 3.5 Cumulative Projects** discusses the approach to evaluation of cumulative projects, that is, other proposed projects whose impacts, taken together with those of the Subregional Long-Term Wastewater Project, might compound or increase the environmental effects.

- **Section 3.6 Required Permits and Approvals** addresses the permits and other governmental approvals which are necessary to implement the Project.

3.1 PROJECT LOCATION AND DESCRIPTION OF ALTERNATIVES

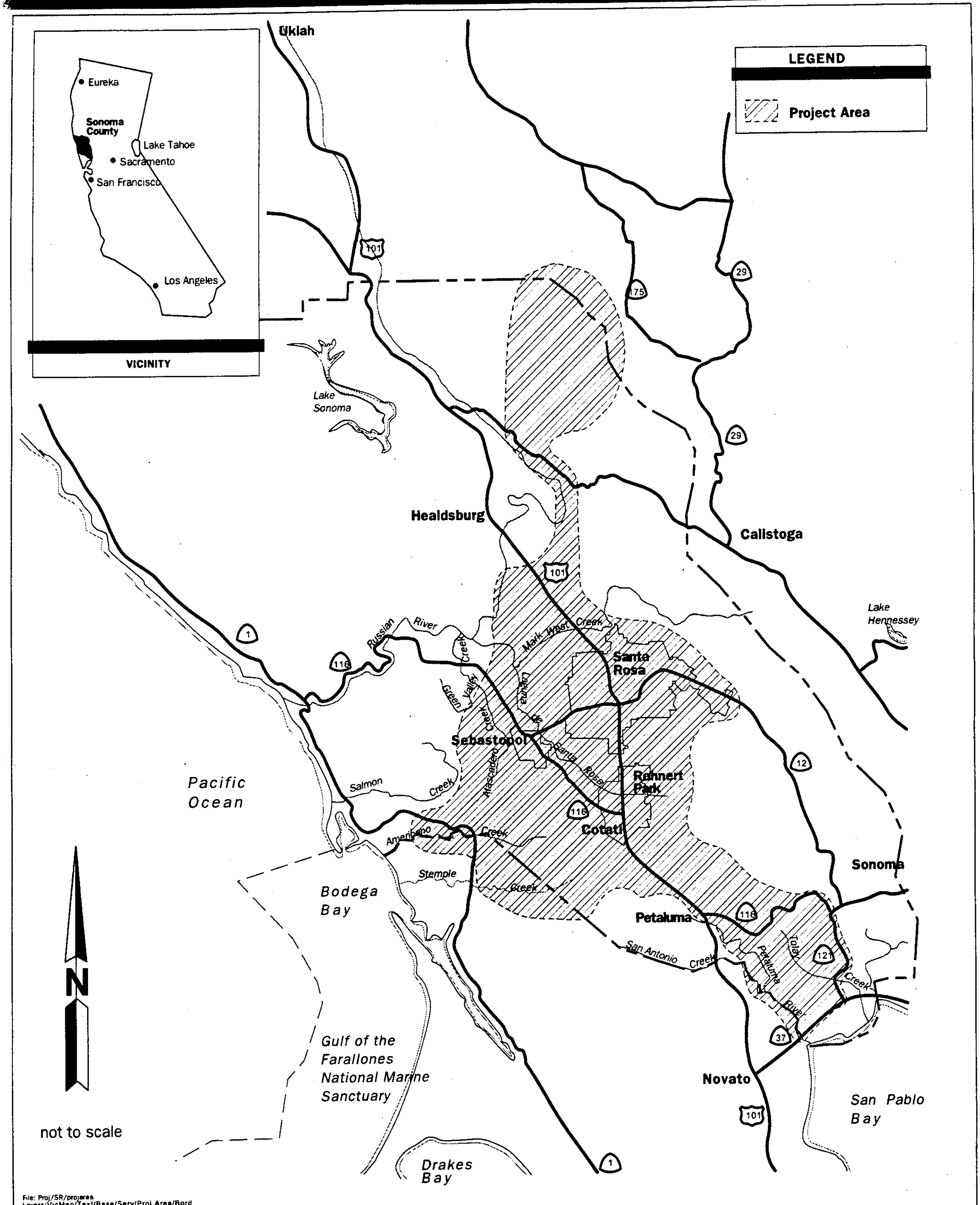
PROJECT LOCATION

The Santa Rosa Subregional Long-Term Wastewater Project consists of five alternative configurations adopted by the Board of Public Utilities on April 19, 1995 for purposes of analysis in the EIR/EIS. The alternatives encompass a large geographic area in Sonoma County and a portion of northern Marin County, covering approximately 400 square miles located in five cities as well as the two Counties. As shown in Figure 3.1-1, the Project area is focused on central Sonoma County within and adjacent to the cities of Santa Rosa, Rohnert Park, Cotati, Petaluma, and Sebastopol, but also extends from the geysers area north of Healdsburg to the Tolay Creek valley southeast of Petaluma and the San Antonio Valley in northern Marin County. The Project area extends from the low coastal hills around Valley Ford in the west, to the lower elevations of the Sonoma Mountains in the east. The Project area includes most of the Santa Rosa Plain, as well as portions of the Mayacmas Mountains, Alexander Valley, Cotati Valley, and Petaluma River Valley. Major waterways in the Project area are the Russian River, the Laguna de Santa Rosa, Santa Rosa Creek, Estero de San Antonio, Estero Americano, Americano Creek, Stemple Creek, Tolay Creek, and the Petaluma River.

DEVELOPMENT OF ALTERNATIVES

To ensure that a reasonable range of alternatives will be considered under NEPA and CEQA, the Santa Rosa Board of Public Utilities directed that alternatives be considered that will represent a wide spectrum of potential solutions to the Subregional System's need to dispose of reclaimed water. This process considered many types of alternatives, for example, construction of large and small reservoirs in South County and/or West County, an ocean outfall disposal, and expanded water conservation alternatives.

An extensive list of potential Project alternatives was developed at the onset of the Step I Scoping Phase (refer to *Final Scoping Report, Volume I,* in Appendix U-1. Appendix U is not found on the CD ROM). These alternatives were developed through the review of alternatives previously considered by the Board of Public Utilities; with input from the public; and from communications with individuals and groups in interviews, written correspondence, and meetings. The Board of Public Utilities identified 75 alternatives suggested prior to March 1993, and an additional 79 alternatives recommended by the public, Santa Rosa City staff, and individuals and agencies since March 1993.



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PARSONS

Santa Rosa
Subregional Long-Term Wastewater Project

Figure 3.1-1

VICINITY/PROJECT AREA

The list of potential alternatives and alternative components was carefully reviewed to develop a manageable list of alternatives for evaluation and screening. A preliminary list of 20 alternatives was prepared which was designed to include all feasible components suggested by the public and develop "all reasonable alternatives" as required by CEQA and NEPA for analysis in the EIR/EIS. This list was distributed to the public for review and comment to ensure that it adequately represented all alternative components nominated for consideration.

During the public review period, an additional 10 alternatives were suggested and were presented to the Board of Public Utilities, which directed that all 30 alternatives be evaluated in the screening process. Two additional alternatives were subsequently developed in response to a request from the public. The screening process was a pre-evaluation and analysis of how well each alternative will be likely to meet system objectives and environmental criteria. The process was designed to determine which of the 32 alternatives should be selected for full study in the EIR/EIS.

The Santa Rosa Long-Term Wastewater Project Screening Report (Harland Bartholomew & Associates 1994), evaluated all 32 alternatives according to criteria adopted by the Board of Public Utilities, following which public workshops were conducted to assist in the selection of alternatives to be studied in the EIR/EIS. The Policy Advisory Committee, Technical Review Group, and Technical Advisory Committee for the Santa Rosa Long-Term Subregional Wastewater Project each advised the Board of Public Utilities by reviewing and providing comment on the Screening Report. In addition, two joint study sessions on the Screening Report were held by the Santa Rosa City Council and Board of Public Utilities, during which public and agency comments concerning alternatives that should be carried forward for review in the EIR/EIS were received orally and in writing.

Based on the findings of the Screening Report and comments received from the public and agencies, the Board of Public Utilities at its May 27, 1994 meeting determined which of the potential Project alternatives and components were to be retained and which ones will be eliminated from further review in the EIR/EIS process. Following additional study sessions in January 1995, the Board of Public Utilities selected five primary alternatives, in addition to the No Action (No Project) Alternative, to be carried forward in the preparation of the EIR/EIS. One alternative, Community Separator/South County Reclamation, was later dropped by the Board of Public Utilities. The two primary components of the Community Separator, wetlands creation and aquifer storage and recovery, were both evaluated and found to be infeasible. After further consideration of the alternatives and comments from interested parties, on April 18, 1995, the Santa Rosa City Council confirmed that four primary alternatives along with the No Action (No Project) Alternative were to be considered equally as the Project for the purposes of the EIR/EIS. At its August 31, 1995 meeting, the Board of Public Utilities added Lakeville bay flats area as part of the Project's agricultural irrigation component.

PROJECT ALTERNATIVES

The five Project alternatives, including the No Action (No Project) Alternative are described in the following sections and shown in Figures 3.1-3 through 3.1-8.

- Alternative 1: No Action (No Project), maintaining the existing Subregional Reclamation System, including the Interim Improvements constructed during 1995-96.
- Alternative 2: South County Reclamation, focusing on expansion of agricultural irrigation and associated reclaimed water storage in areas south of Santa Rosa.
- Alternative 3: West County Reclamation, focusing on expansion of agricultural irrigation and associated reclaimed water storage in areas west of Santa Rosa.
- Alternative 4: Geysers Recharge, focusing on injection of reclaimed water for recharge of the geysers steamfield located in the Mayacmas Mountains.
- Alternative 5: Discharge, focusing on the discharge of reclaimed water to the Russian River at a design discharge rate of up to 20% of river flow.

These alternatives include components which provide for agricultural and urban irrigation, recharge of the geysers steamfield, and design discharge to the Russian River at rates of 1% and 20% of river flow. Alternatives 2 and 3 (focusing on South County irrigation and West County irrigation, respectively) with a design discharge rate of 1%, and Alternative 5 with a design discharge rate of up to 20% of river flow will represent the extremes of this range. (Alternative 4, which uses reclaimed water for recharge of the geysers steamfield, will also have a maximum of 1% discharge, but only during peak wet weather periods.)

These alternatives thus allow the maximum range of levels of impacts to be evaluated for the Project, with Alternative 5 having greater discharge volume while Alternatives 2 and 3 have less discharge volume, but require more facility construction. Although the Project could utilize a design discharge rate anywhere between 1% and 20%, three intermediate discharge scenarios, using 5%, 10%, and 15% discharge rates were selected as benchmarks in evaluating the differences in impacts along the discharge rate continuum between 1% and 20%. These scenarios are discussed in the *Range of Discharge Evaluation* (see Appendix A) (Harland Bartholomew & Associates, Inc. 1996).

Because the Project alternatives include a series of Project components and a range of discharge rates to the Russian River, they encompass a wide scope of potential environmental impacts, and such impacts are analyzed for each individual component, as well as for each of the alternatives. Therefore, this analysis, by addressing impacts of individual components as well as the five alternatives, is intended to allow the selection of a Project that falls within the range of alternatives included in this EIR/EIS, and which

may include components which are reduced in scope, or may combine components from more than one alternative.

Alternatives 2-5 were designed to meet the purpose and need of the Project: disposal of 10,050 million gallons (MG) of reclaimed water in a reliable, practicable manner that provides the best use of water resources, while protecting public health and the environment. To that end, options were developed to maximize reclamation, recycling, and reuse and to optimize water conservation. Alternatives 2 through 5 include conservation measures that will reduce the annual average production of reclaimed water to 8,220 MG. Alternatives 2 and 3 center around reuse of reclaimed water through irrigation for both agriculture and urban uses. Alternative 4 proposes reuse of the water to recharge the geysers steamfield and generate energy. Alternative 5 recycles the water by returning it to the Russian River at a location close to the point at which it was removed. The discharge option provides reuse of the reclaimed water by providing increased habitat in the Russian River during low flow periods.

Determination of Wastewater Flows and Reclamation System Requirements

Projection of Future Wastewater Flows

The first element in the planning and design of the Subregional System reclaimed water disposal facilities is to Project future wastewater flows. Typically future flows are projected based upon historical flow factors (such as flow per dwelling unit, flow per employee, or flow per capita) and projected numbers of dwelling units, employees, and population. The flow factors are normally estimated using current or historical wastewater flows, and current or historical data (e.g., number of dwelling units and employees) which matches the years when flow data are available.

However, in recent years, the State of California has instituted water conservation laws, and the Subregional System member entities have implemented programs which reduce water use and wastewater flow generation. These laws and programs result in a decrease in the flow factors and projected wastewater flows (termed the "with conservation" flows) below the expected flow if these laws and programs did not exist (termed the "non-conservation" flows). The non-conservation flow, therefore, will be the flow if there were no low flow toilets, no low flow showerheads, and none of the member entities of the Subregional System had metered water connections with commodity rates or were performing water audits. Table 3.1-1 shows the wastewater flow factors adjusted for the effects of current wastewater conservation programs.

Table 3.1-1

Wastewater Flow Factors Adjusted for Effects of Current Water Conservation Programs[1]

	Residential (gallons/day/dwelling units)			Commercial/Industrial/Institutional (gallons/day/employee)		
Member Entity	**1994**	**Buildout**	**Non-Conservation**	**1994**	**Buildout**	**Non-Conservation**
Santa Rosa[2]	192.0	171.0	214.4	40.5	35.5	43.7
Rohnert Park/Cotati	197.9	176.5	223.1	32.1	29.5	36.2
Sebastopol	126.0	109.3	141.4	41.7	38.9	45.2

Source: West Yost & Associates 1995

1 The non-conservation flow is the flow without use of low flow toilets or shower heads, and without implementation of water metering with commodity rate structures and without audit programs
2 Includes South Park County Sanitation District

For the purposes of determining future system requirements, the wastewater flows are projected on the basis of average dry weather flow, which is the average daily flow during dry weather, and consists mainly of wastewater, without any stormwater inflow. (Storm water inflow and groundwater that enters the system, is treated at the Laguna Plant, and thus becomes part of the volume of reclaimed water from the Plant, and is accounted for in the operation of the Water Balance Model described in the next section.)

Projected wastewater flows and resulting design criteria for the Project are based upon complete buildout as projected in the General Plans of the Subregional System's member entities (in effect in April 1994). At buildout, they will have 96,000 dwelling units and non-residential uses with 100,000 employees. The resultant projected wastewater flow is approximately 21 million gallons per day (mgd) average dry weather flow, a 22 % increase over the 1994 average dry weather flow of 17 mgd (See Table 3.1-2).

Table 3.1-2

Projected Average Dry Weather Wastewater Flow with Water Conservation

	1994			Buildout of the General Plan		
	Quantity (DU[1]) (employees)	Flow Generation Factor (gal/day/DU[1]) (gal/day/employee)	Proj. Flow (mgd)	Quantity (DU[1]) (employees)	Flow Generation Factor (gal/day/DU[1]) (gal/day/employee)	Proj. Flow (mgd)
Santa Rosa & SouthPark County Sanitation District						
Residential	49,501	192.3	9.52	72,900	171.4	12.47
Commercial/Industrial /Institutional	79,467	40.5	3.22	98,500	35.5	3.50
Santa Rosa Total			12.74			16.31
Rohnert Park						
Residential	13,978	192.8	2.69	15,510	171.7	2.66
Commercial/Industrial /Institutional	14,166	30.8	0.44	20,000	28.2	0.57
Sonoma State University	5,800 Stu	19.8 gallons/day/stu	0.115	10,000 stu	19.8 gallons/day/stu	0.20
Rohnert Park Total			3.24			3.43
Cotati						
Residential	2,544	192.8	0.49	4,066	171.7	0.69
Commercial/Industrial /Institutional	1,412	32.1	0.05	2,331	29.5	0.07
Cotati Total			0.53			0.76
Sebastopol						
Residential	3,015	126.0	0.38	4,359	109.3	0.48
Commercial/Industrial /Institutional	5,282	41.7	0.22	6,600	38.9	0.26
Sebastopol's Remaining Current Capacity						0.10
Sebastopol Total			0.60			0.84
Total						
Residential	69,258		13.08	96,835		16.74
Commercial/Industrial /Institutional	100,327		4.03	127,431		4.60
Subregional System Total			17.11			21.34

Source: West Yost & Associates 1995

1. DU - dwelling units

The conservation programs of the Subregional System's member entities have already produced a significant reduction in average dry weather flow and will produce an even larger reduction in the future (See Table 3.1-3). Without conservation (without the use of low-flow toilets, low-flow shower heads, and water meters with commodity pricing), it is estimated that the 1994 wastewater average dry weather flow will be 19 mgd, about 11 % above the actual average dry weather flow. Without conservation, the buildout wastewater average dry weather flow is estimated to be approximately 26 mgd, about 25 % above that with conservation. More detailed information about the projected wastewater flows and water conservation can be found in the Technical Memorandum, *Projected Wastewater Flows* (West Yost 1995).

Table 3.1-3

Projected Average Dry Weather Wastewater Flow without Water Conservation[1]

	1994			Buildout of the General Plan		
	Quantity (DU) (employees)	Flow Generation Factor (gal/day/DU) (gal/day/employee)	Proj. Flow (mgd)	Quantity (DU) (employees)	Flow Generation Factor (gal/day/DU) (gal/day/employee)	Proj. Flow (mgd)
Santa Rosa & South Park County Sanitation District						
Residential	49,501	215.0	10.64	72,900	214.6	15.64
Commercial/Industrial /Institutional	79,467	43.7	3.48	98,500	43.7	4.31
Santa Rosa Total			14.02			19.95
Rohnert Park						
Residential	13,978	217.7	3.04	15,510	217.7	3.38
Commercial/Industrial /Institutional	14,166	34.9	0.50	20,000	34.9	0.70
Sonoma State University	5,800	19.8 gallons/day/Stu	0.115	10,000	19.8 gallons/day/Stu	0.20
Rohnert Park Total			3.66			4.28
Cotati						
Residential	2,544	217.7	0.55	4,066	217.7	0.89
Commercial/Industrial /Institutional	1,412	34.9	0.05	2,331	34.9	0.08
Cotati Total			0.60			0.97
Sebastopol						
Residential	3,015	141.4	0.43	4,359	141.4	0.62
Commercial/Industrial /Institutional	5,282	45.2	0.24	6,600	45.2	0.30
Sebastopol Total			0.67			0.92

Table 3.1-3

Projected Average Dry Weather Wastewater Flow without Water Conservation[1]

	1994			Buildout of the General Plan		
	Quantity (DU) (employees)	Flow Generation Factor (gal/day/DU) (gal/day/employee)	Proj. Flow (mgd)	Quantity (DU) (employees)	Flow Generation Factor (gal/day/DU) (gal/day/employee)	Proj. Flow (mgd)
Total						
Residential	69,258		14.66	96,384		20.53
Commercial/Industrial /Institutional	100,327		4.39	127,431		5.59
Subregional System Total			19.05			26.12

Source: West Yost & Associates 1995

1. The non-conservation flow is the flow without use of low flow toilets or shower heads, and without implementation of water metering with commodity rate structures and without audit programs.

Design Discharge Rate

Design discharge reflects the maximum monthly discharge rate during normal operations. For example, a 5% "design discharge" scenario indicates that the Project was designed with facilities that will allow monthly average discharge to the Russian River at 5% or less of the river flow in at least 19 out of 20 months. Median and average discharges will be well below the design discharge, as shown in the following table. This table demonstrates that for the 1% design discharge, there will be no discharge at all for over half of the discharge season. Higher percentages of discharge occur only when river flow is very low. Discharge is a very low percentage of river flow when water levels are high. Thus, when discharge percentage is highest, the total volume discharged is lowest. Although design was based on modeling of monthly flows, operation will be based on daily river flows. Therefore, hydrology and water quality analysis was based on a simulation of daily operations.

Table 3.1-4

Median and Average Discharge Proportions

Design Discharge as Proportion of River Flow	Average Annual Discharge Volume (MG/yr)	Median Monthly Discharge as Proportion of River Flow	Average Monthly Discharge as Proportion of River Flow
1 %	685	0 %	< 0.5 %
5 %	1,825	3 %	1 %
10 %	2,740	0.8 %	2 %
15 %	3,490	not calculated	not calculated
20 %	4,640	3.2 %	4 %
No Action	3,245	not calculated	not calculated

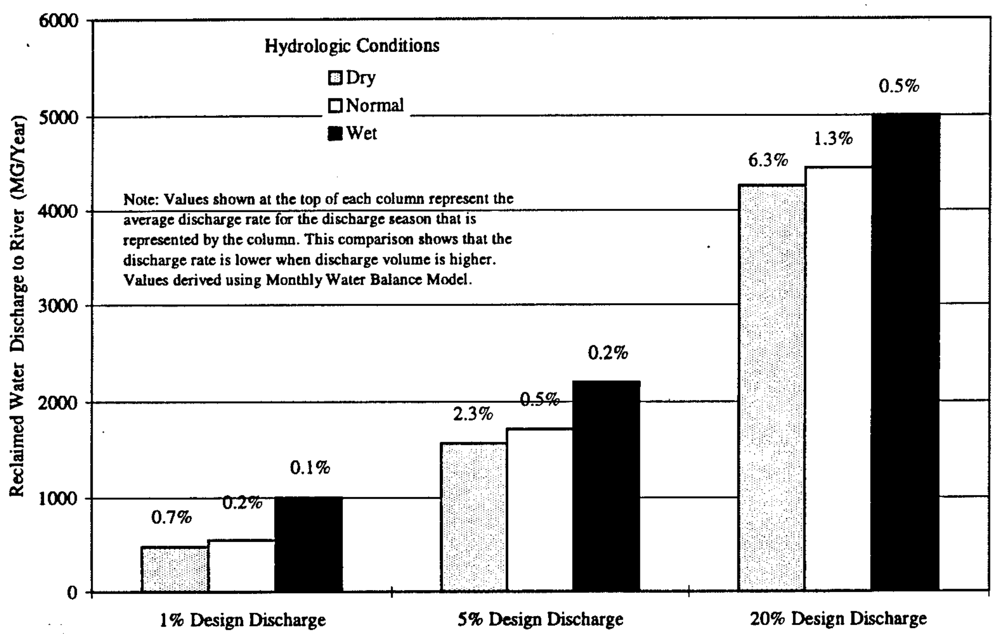
Souce: Parsons Engineering Science, Inc. 1996; Merritt Smith Consulting 1996

The design discharge rate is used to plan for the size of Project components, such as storage facilities, pipelines, and irrigation areas. For analysis of specific impacts that may result from the Project, other measures related to discharge may be used, such as the monthly maximum reclaimed water discharge to the Russian River, used in some water quality analyses. In addition to the design discharge rate, there is also a contingency discharge rate, as discussed at the end of this section.

The amount of reclaimed water that will be discharged to the Russian River via the Laguna each year depends on River flow. In wet years when River flows are relatively high, discharge volume will be higher than in dry years. The concentration of reclaimed water in the River and Laguna will generally be lower in wet years than in dry years. This relationship is shown on Figure 3.1-2.

Reclamation System Requirements

A Monthly Water Balance Model was used to determine system requirements (storage volume and irrigation area) for alternatives 2 and 3, South and West County, respectively. Other system requirements such as sizing of pipelines and pump stations for these alternatives, as well as alternatives 4 and 5, the geysers and discharge alternatives (which do not involve storage and irrigation), were developed concurrently, and based partially on the results from this model. System requirements for Project alternatives were established by simulating Subregional System operations for a 70-year period (1923-1992).



Source: Parsons Engineering Science, Inc. 1995
Merritt Smith Consulting 1996

DISCHARGE VOLUME and DISCHARGE RATE in DRY, NORMAL and WET YEARS

Figure 3.1-2

The Monthly Water Balance Model for reclamation system operations is based on monthly Russian River flow estimates generated by the Sonoma County Water Agency Russian River Flow Model. The Water Agency's model generated river flow estimates for the Hacienda Bridge (USGS) gaging station between 1923 and 1992. The Water Agency's model data is based on water use conditions projected for the year 2010.

The Monthly Water Balance Model includes components for reclaimed water inflow (i.e., treatment plant effluent or inflow to the irrigation system), irrigation requirements, storage requirements, and reclaimed water discharge to the Russian River. The model balances the reclaimed water inflow with the various demands for irrigation and storage and subsequently determines required discharge to the Russian River.

The system is subject to variations in inflow due to storm events and will also have operational limitations on the ability to move stored reclaimed water from one location to another to balance storage in the event of sudden large increases in wet weather flow. Designing a system for 100 % reliability to avoid exceedence of a specific discharge rate under these conditions will require an increase in system requirements which will be used only under extreme wet weather conditions. Providing this level of redundancy in system requirements will increase costs and potentially, environmental impacts. Therefore, the water reclamation system is being designed to have a reliability of 1:20, months, based on the 70-year history of river flow, i.e., normal system capacity may be exceeded only one month in 20 discharge months. Discharge is allowed between October 1 and May 14, approximately eight months of the year, and this translates to about one contingency event every 2-1/2 calendar years. Volumes in excess of the normal system capacity are considered as contingency volumes and addressed by the Contingency Plan discussed in Section 3.3 of this document.

The Monthly Model accounts for stormwater inflow by adjusting monthly flows upward based on hydrologic conditions. In a wet year, monthly reclaimed water flow will be much greater than in the same month of a dry year. Monthly reclaimed water flow in summer is less than that in winter because groundwater infiltration and stormwater inflow are much less than in winter.

Irrigation requirements, expressed in acres and annual volume of reclaimed water required for irrigation, are determined using annual application rate requirements for different irrigation uses (e.g., vineyards or pasture), local precipitation rates, and soil types. The annual volume requirements are further subdivided into monthly irrigation volumes for use in calculating storage requirements. After irrigation requirements are satisfied, actual river discharge is calculated by comparing water available for storage to the target storage volume. Target storage is defined as the accumulated volume desired in the storage system for any given month. Monthly target storage values are input to the model as a fraction of maximum storage. Collectively, the target storage values comprise the target storage curve, which was developed to minimize the storage necessary to meet a particular irrigation requirement. Preliminary storage volume (based on target storage), is compared to the maximum storage available to ensure that the maximum is not exceeded. The Daily Water Balance Model was developed using the same assumptions

but simulated operations on a daily time step for purposes of evaluating Project impacts. The monthly and daily water balance model are compared in the *Analysis of Results from Daily and Monthly Water Balance Models* (Parsons Engineering Science, Inc. 1996b).

The model was run for both alternatives 2 and 3, under five design discharge rate scenarios: 1%, 5%, 10%, 15%, and 20%. As the design discharge rate increases, system requirements for irrigation and storage decrease (see Table 3.1-5). Irrigation requirements (i.e., the quantity needed to meet irrigation demand) differ between alternatives 2 and 3 because of the differing crop type, local precipitation, and soils between the South and West counties. The 1% design discharge rate with Sebastopol irrigation area requires the greatest total number of acres for irrigation because Sebastopol irrigation has the lowest annual irrigation demand or consumption rate. The total incremental required irrigated acreage (in addition to existing acreage) for the South County and Sebastopol is 5,200 acres, the maximum total for West County and Sebastopol is 6,900 acres. The maximum active reclaimed water storage volume that will need to be added for both alternatives, with or without Sebastopol agricultural irrigation, is 4,000 MG.

Table 3.1-5

Annual Reclamation System Requirements
(Based on Average Dry Weather Flow = 21 mgd)

System Requirements[1]	Russian River Design Discharge Rate[2] 1%	5%	10%	15%	20%
Alternative 2 - South County Reclamation					
Existing Storage (MG)	1,200	1,200	1,200	1,200	1,200
New Storage (MG)	4,000	2,900	1,900	1,000	0
Total Storage (MG)	5,200	4,100	3,100	2,200	1,200
Existing Irrigation Area (acres)	5,500	5,500	5,500	5,500	5,500
Urban Irrigation Area (acres)	400	400	400	400	100
South County Agricultural Irrigation Area (acres)	3,800	2,600	1,600	1,400	0
Total Irrigation Area (acres)	9,700	8,500	7,500	7,300	5,600
Contingency Volume Summary					
Average Contingency Volume (MG/month)[3]	124	137	111	112	118
Maximum Contingency Volume (MG/month)[3]	326	491	438	379	327
Alternative 2 - South County with Sebastopol Reclamation					
Existing Storage (MG)	1,200	1,200	1,200	1,200	1,200
New Storage (MG)	4,000	2,900	1,900	1,000	0
Total Storage (MG)	5,200	4,100	3,100	2,200	1,200
Existing Irrigation Area (acres)	5,500	5,500	5,500	5,500	5,500
Urban Irrigation Area (acres)	400	400	400	400	100
South County Agricultural Irrigation Area (acres)	2,600	1,300	300	300	0
Sebastopol Agricultural Irrigation Area (acres)	2,200	2,200	2,200	2,200	0
Total Irrigation Area (acres)	10,700	9,400	8,400	8,400	5,600

Table 3.1-5

Annual Reclamation System Requirements
(Based on Average Dry Weather Flow = 21 mgd)

System Requirements[1]	Russian River Design Discharge Rate[2] 1%	5%	10%	15%	20%
Contingency Volume Summary					
Average Contingency Volume (MG/month)[3]	125	137	109	112	118
Maximum Contingency Volume (MG/month)[3]	326	491	438	379	327
Alternative 3 - West County Reclamation					
Existing Storage (MG)	1,200	1,200	1,200	1,200	1,200
New Storage (MG)	4,000	2,900	1,900	1,000	0
Total Storage (MG)	5,200	4,100	3,100	2,200	1,200
Existing Irrigation Area (acres)	5,500	5,500	5,500	5,500	5,500
Urban Irrigation Area (acres)	400	400	400	400	100
West County Agricultural Irrigation Area (acres)	6,200	4,400	2,900	1,400	0
Total Irrigation Area (acres)	12,100	10,300	8,800	7,300	5,600
Contingency Volume Summary					
Average Contingency Volume (MG/month)[3]	126	137	109	112	118
Maximum Contingency Volume (MG/month)[3]	326	491	438	379	327
Alternative 3 - West County with Sebastopol Reclamation					
Existing Storage (MG)	1,200	1,200	1,200	1,200	1,200
New Storage (MG)	4,000	2,900	1,900	1,000	0
Total Storage (MG)	5,200	4,100	3,100	2,200	1,200
Existing Irrigation Area (acres)	5,500	5,500	5,500	5,500	5,500
Urban Irrigation Area (acres)	400	400	400	400	100
West County Agricultural Irrigation Area (acres)	4,300	2,600	1,000	300	0
Sebastopol Agricultural Irrigation Area (acres)	2,200	2,200	2,200	2,200	0
Total Irrigation Area (acres)	12,400	10,700	9,100	8,400	5,600
Contingency Volume Summary					
Average Contingency Volume (MG/month)[3]	126	137	109	112	118
Maximum Contingency Volume (MG/month)[3]	326	491	438	379	327

Source: Parsons Engineering Science, Inc. 1995

Notes:
1. System requirements are defined as the storage volume and irrigation area necessary to meet the reliability requirement. The reliability requirement is that reclaimed water production may exceed normal system capacity only one month in twenty.
2. Design discharge rate as a percentage of Russian River flow, as permitted by the Regional Water Quality Control Board.
3. Contingency volume is defined as the amount of reclaimed water produced in excess of the design discharge rate. Contingency volumes occur only one month in twenty discharge months (i.e., discharge months are October to May) or about once every 2-1/2 years. Average and maximum contingency volumes are based on a statistical analysis covering a 70-year period of record of Russian River flow.

Contingency volume is defined as the amount of reclaimed water in excess of the allowable river discharge. Allowable river discharge is the monthly volume of Russian River flow multiplied by the allowable design discharge rate (1%, 5%, 10%, or 20% of river flow). The Contingency Plan (described further in Section 3.3) includes three elements to manage the contingency volume that will occur and to reduce the portion of the contingency volume that must be discharged. Contingency volumes will be managed through contingency storage, winter irrigation, emergency conservation, and as a last resort, additional river discharge. The storage and irrigation systems were sized so that contingency volumes will occur in just one of every 20 months (consistent with Regional Water Quality reliability requirements).

Average contingency volumes range from 109-137 MG per month in which a contingency volume occurs. The maximum contingency volumes estimated using the Monthly Water Balance Model are 326, 491, 438, and 327 MG, for the 1%, 5%, 10%, and 20% design discharge rates, respectively. When contingency discharge occurs, the maximum monthly discharge rates are estimated to be 1%, 7.3%, 13.4%, and 28.3% for the 1%, 5%, 10%, and 20% design discharge rates respectively. There is no contingency discharge for the 1% design discharge rate. The Contingency Plan is further discussed in Section 3.3 of this document.

RECLAIMED WATER ALLOCATION FOR PROJECT ALTERNATIVES

Based upon the projected flow of 21 mgd average dry weather flow, allocations have been prepared for the resulting reclaimed water flow from the Laguna Plant of 22.5 mgd average daily flow. (The projected flow for the No Action Alternative is 16.2 mgd average dry weather flow and 17.4 mgd average daily flow, see Table 3.1-6). The allocations for alternatives 2 and 3 represent a design discharge of 1% of river flow; the allocation for Alternative 5 represents a design discharge up to 20% of river flow. Thus, alternatives 2 through 5 represent the impacts associated with the range of potential discharge rates between 1% and 20% of river flow. Tables showing the allocation of reclaimed water for alternative discharge options of 5%, 10%, and 15% of river flow are provided in the *Range of Discharge Evaluation,* (Harland Bartholomew & Associates, Inc. 1996).

The reclaimed water allocations shown in Table 3.1-6 are presented on an annual basis, using average annual flows. These annual flows are based on the designated average dry weather flow of 21 mgd for alternatives 2, 3, 4 and 5, and 16.2 mgd for Alternative 1, and they account for inflow of storm water into the system. These data are based on assumptions, calculations, and results presented in a series of water balance technical memoranda (Parsons Engineering Science, Inc. 1995g-h, 1996b).

Table 3.1-6

Reclaimed Water Allocation

Alternative 1 - (No Project) No Action

AVERAGE ANNUAL FLOW					
WASTEWATER WITHOUT CONSERVATION (MG/Yr)	CONSERVATION (MG/Yr)	REUSE (MG/Yr)	DISCHARGE (MG/Yr)	STORAGE MG	COMMENTS
Existing Conditions (April 1995)					
7,500					Current Estimated Output
	(30)				City Retrofit Demonstration Program
		20			Wetlands
		3,000			Agricultural Irrigation Normal
		10			Agricultural Irrigation Low
		210			Golf Course - Oakmont
		210			Golf Course - Mountain Shadows
		10			Urban Irrigation
				1,200	Storage
			4,010		Russian River/Laguna Discharge
Interim Period System Improvements					
		80			Urban Irrigation - Rohnert Park
		80			West Cotati Pipeline Project
		40			North Pipeline Extension
	(150)				Adopted Retrofit Program
			(350)		Russian River/Laguna Discharge
Alternative 1 Implementation(December 1997)					
380					Estimated Additional Output - Buildout
	(875)				State Regulations
	-				Expanded Retrofit Program
		-			Urban Irrigation - Fountain Grove
		-			Urban Irrigation - Bennett Valley
		-			Agricultural Irrigation - South County
		-			Agricultural Irrigation - West County
		-			Optional Irrigation - Sebastopol
		-			Geysers Steamfield Recharge
			(495)		Russian River/Laguna Discharge
				-	Storage - South County Reservoirs
				-	Storage - West County Reservoirs
				-	Optional Aquifer Storage and Recovery (ASR)
7,880	(1,055)	3,580	3,165	1,200	Total
	6,825	6,825			Grand Total

Table 3.1-6 (Continued)

Reclaimed Water Allocation

Alternative 2 - South County Reclamation

AVERAGE ANNUAL FLOW					
WASTEWATER WITHOUT CONSERVATION (MG/Yr)	CONSERVATION (MG/Yr)	REUSE (MG/Yr)	DISCHARGE (MG/Yr)	STORAGE MG	COMMENTS
Existing Conditions (April 1995)					
7,500					Current Estimated Output
	(30)				City Retrofit Demonstration Program
		20			Wetlands
		3,000			Agricultural Irrigation Normal
		10			Agricultural Irrigation Low
		210			Golf Course - Oakmont
		210			Golf Course - Mountain Shadows
		10			Urban Irrigation
				1,200	Storage
			4,010		Russian River/Laguna Discharge
Interim Period System Improvements					
		80			Urban Irrigation - Rohnert Park
		80			West Cotati Pipeline Project
		40			North Pipeline Extension
	(150)		350		Adopted Retrofit Program
Alternative 2 Implementation					
2,550					Estimated Additional Output - Buildout
	(1,270)				State Regulations
	(380)				Expanded Retrofit Program
		190			Urban Irrigation - Fountain Grove
		190			Urban Irrigation - Bennett Valley
		3,575			Agricultural Irrigation - South County
		-			Agricultural Irrigation - West County
		Optional			Optional Irrigation - Sebastopol[1]
		-			Geysers Steamfield Recharge
			(3,055)		Russian River/Laguna Discharge
				4,000	Storage - South County Reservoirs
				-	Storage - West County Reservoirs
10,050	(1,830)	7,535	605	5,200	Total
	8,220	8,220			Grand Total

[1] Sebastopol Irrigation is an optional component which will reuse 1,200 MG of reclaimed water per year; if selected, only 2,400 MG/yr of reuse will go to Agricultural Irrigation - South County.

Table 3.1-6 (Continued)

Reclaimed Water Allocation

Alternative 3 - West County Reclamation

AVERAGE ANNUAL FLOW					
WASTEWATER WITHOUT CONSERVATION (MG/Yr)	CONSERVATION (MG/Yr)	REUSE (MG/Yr)	DISCHARGE (MG/Yr)	STORAGE MG	COMMENTS
Existing Conditions (April 1995)					
7,500					Current Estimated Output
	(30)				City Retrofit Demonstration Program
		20			Wetlands
		3,000			Agricultural Irrigation Normal
		10			Agricultural Irrigation Low
		210			Golf Course - Oakmont
		210			Golf Course - Mountain Shadows
		10			Urban Irrigation
				1,200	Storage
			4,010		Russian River/Laguna Discharge
Interim Period System Improvements					
		80			Rohnert Park Urban Irrigation
		80			West Cotati Pipeline Project
		40			North Pipeline Extension
	(150)				Adopted Retrofit Program
			(350)		Russian River/Laguna Discharge
Alternative 3 Implementation					
2,550					Estimated Additional Output - Buildout
	(1,270)				State Regulations
	(380)				Expanded Retrofit Program
		190			Urban Irrigation - Fountain Grove
		190			Urban Irrigation - Bennett Valley
		-			Agricultural Irrigation - South County
		3,585			Agricultural Irrigation - West County
		Optional			Optional Irrigation - Sebastopol[1]
		-			Geysers Steamfield Recharge
			(3,065)		Russian River/Laguna Discharge
				-	Storage - South County Reservoirs
				4,000	Storage - West County Reservoirs
10,050	(1,830)	7,545	595	5,200	Total
	8,220	8,220			Grand Total

[1] Sebastopol Irrigation is an optional component which will reuse 1,200 MG of reclaimed water per year; if selected, only 2,400 MG/yr of reuse will go to Agricultural Irrigation - West County.

Table 3.1-6 (Continued)

Reclaimed Water Allocation
Alternative 4 - Geysers Recharge

AVERAGE ANNUAL FLOW					
TOTAL WASTEWATER (MG/Yr)	**CONSERVATION (MG/Yr)**	**REUSE (MG/Yr)**	**DISCHARGE (MG/Yr)**	**STORAGE MG**	**COMMENTS**
			Existing Conditions		
7,500					Current Estimated Output
	(30)				City Retrofit Demonstration Program
		20			Wetlands
		3,000			Agricultural Irrigation Normal
		10			Agricultural Irrigation Low
		210			Golf Course - Oakmont
		210			Golf Course - Mountain Shadows
		-			Urban Irrigation
				1,200	Storage
			4,010		Russian River/Laguna Discharge
			Interim Period System Improvements		
		80			Urban Irrigation - Rohnert Park
		80			West Cotati Pipeline Project
		40			North Pipeline Extension
	(150)				Adopted Retrofit Program
			(350)		Russian River/Laguna Discharge
			Alternative 4 Implementation		
2,550					Estimated Output - Buildout
	(1,270)				State Regulations
	(380)				Expanded Retrofit Program
		-			Urban Irrigation - Fountain Grove
		-			Urban Irrigation - Bennett Valley
		(1,700)			Agricultural Irrigation/Laguna Discharge
		-			Agricultural Irrigation - South County
		-			Agricultural Irrigation - West County
		-			Optional Irrigation - Sebastopol
		6,270			Geysers Steamfield Recharge
			(3,690)[1]		Russian River/Laguna Discharge
				-	Storage - South County Reservoirs
				-	Storage - West County Reservoirs
				-	Optional Aquifer Storage and Recovery (ASR)
10,050	(1,830)	8,220	0[1]	1,200	Total
	8,220	8,220			Grand Total

[1] Up to 0.65 % of Russian River flow may be discharged during peak wet weather events.

Table 3.1-6 (Continued)

Reclaimed Water Allocation
Alternative 5 - Discharge

AVERAGE ANNUAL FLOW					
WASTEWATER WITHOUT CONSERVATION(MG/Yr)	CONSERVATION (MG/Yr)	REUSE (MG/Yr)	DISCHARGE (MG/Yr)	STORAGE MG	COMMENTS
Existing Conditions (April 1995)					
7,500					Current Estimated Output
	(30)				City Retrofit Demonstration Program
		20			Wetlands
		3,000			Agricultural Irrigation Normal
		10			Agricultural Irrigation Low
		210			Golf Course - Oakmont
		210			Golf Course - Mountain Shadows
		10			Urban Irrigation
				1,200	Storage
			4,010		Russian River/Laguna Discharge
Interim Period System Improvements					
		80			Urban Irrigation - Rohnert Park
		80			West Cotati Pipeline Project
		40			North Pipeline Extension
	(150)				Adopted Retrofit Program
			(3570)		Russian River/Laguna Discharge
Alternative 5 Implementation					
2,550					Estimated Additional Output - Buildout
	(1,270)				State Regulations
	(380)				Expanded Retrofit Program
		-			Urban Irrigation - Fountain Grove
		-			Urban Irrigation - Bennett Valley
		-			Agricultural Irrigation - South County
		-			Agricultural Irrigation - West County
		-			Optional Irrigation - Sebastopol
		-			Geysers Steamfield Recharge
			900		Russian River/Laguna Discharge
				-	Storage - South County Reservoirs
				-	Storage - West County Reservoirs
10,050	(1,830)	3,580	4,560	1,200	Total
	8,220	8,220			Grand Total

ALTERNATIVE 1 - NO ACTION (NO PROJECT)

The No Action Alternative evaluates impacts which will occur if no Project were implemented. In this case, the No Action Alternative consists of the existing Santa Rosa Subregional Water Reclamation System (as of April 19, 1995), plus various upgrades at the treatment plant, as well as other projects to improve the reliability of the reclamation system prior to implementation of the Long-Term Wastewater Project (see Figures 3.1-3 and 3.1-4). These projects are:

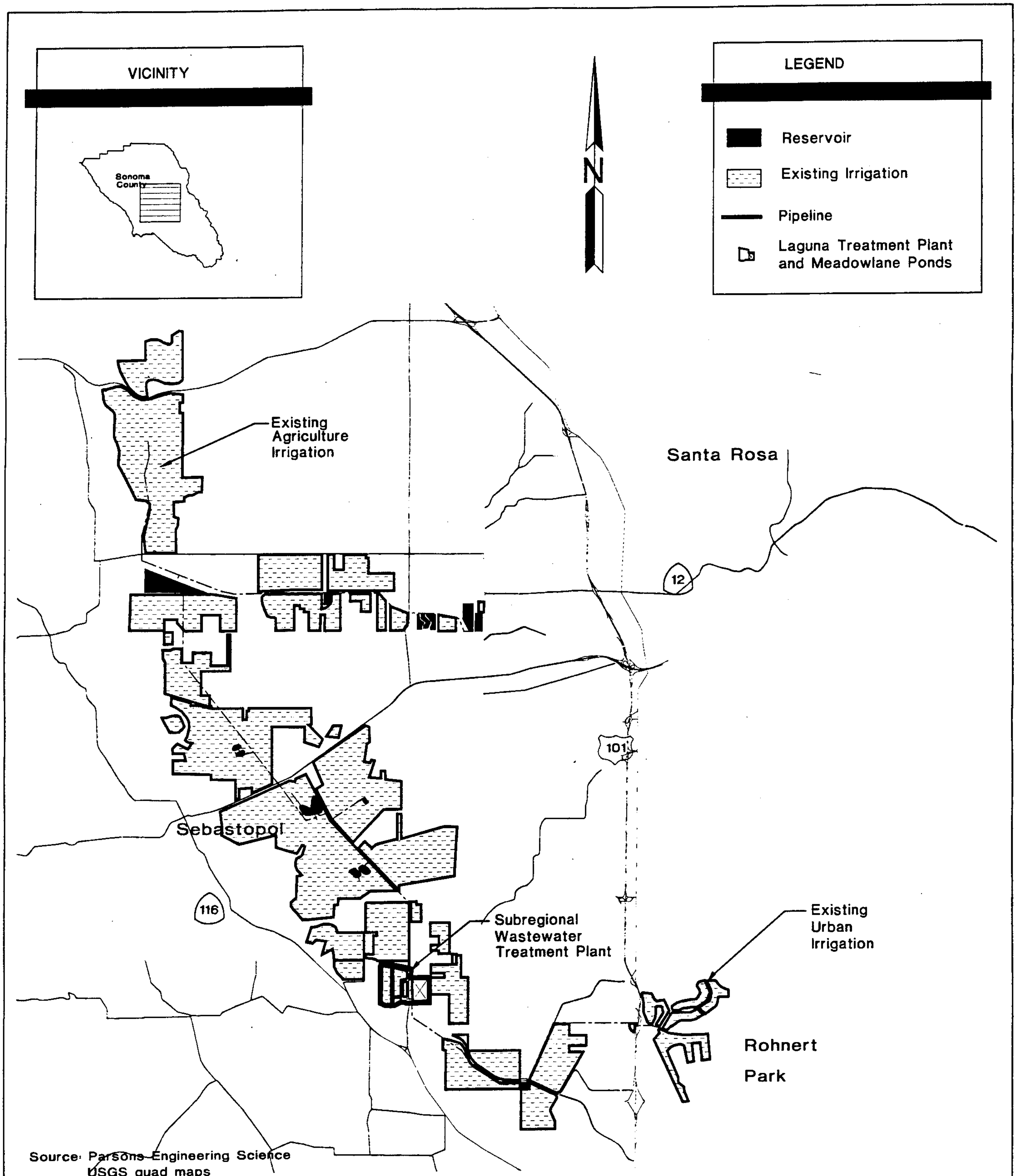
- The North Pipeline Extension;
- The Rohnert Park Reuse Project;
- The West Cotati Reclamation Pipeline Project;
- The Meadowlane Sludge Composting Facility; and
- The Laguna Joint Wetland Project.

These projects are described in Section 3.2.

The existing irrigation areas will be retained, including those which are part of the interim Project improvements identified above. No new storage, irrigation, or discharge facilities will be provided.

Under Alternative 1, the treatment capacity of the Subregional System will remain at 18 mgd average dry weather flow, limited by the capacity of the influent pumps. This Alternative assumes continuation by the Subregional System member entities of existing water conservation practices. It also assumes that projected growth as indicated in the General Plans adopted as of April 1994 of each of the Subregional entities will continue through December 1997. At this point it is assumed that no additional connections to the Subregional System will be allowed by the North Coast Regional Water Quality Control Board due to the inability of the system to comply with the Board's requirements.

With the additional development through December, 1997 the projected wastewater flow under Alternative 1 will be approximately 16.2 mgd average dry weather flow. This is a reduction from the 1994 flow of 17 mgd, and will result from the continued implementation of current conservation practices. The equivalent wastewater generation without conservation will be 20 mgd. However, for modeling of water quality impacts under the No Action Alternative, a projected wastewater flow of 17.42 mgd average dry weather flow was used, based upon the reported 1995 discharge from the Laguna Plant. This translates to annual flows under the No Action Alternative of almost 7,000 MG, as compared to a reliable annual reuse and disposal capacity of only about 3,800 MG with the current 1% discharge restriction. This large short-fall in disposal capacity means that under adverse weather conditions, with very low flows in the river, the City might be forced to discharge at rates up to 10% of river flow.



HARLAND BARTHOLOMEW and ASSOCIATES, INC.

A UNIT OF PARSONS INFRASTRUCTURE and TECHNOLOGY GROUP INC.

PARSONS

Santa Rosa

Subregional Long-Term Wastewater Project

EXISTING RECLAMATION SYSTEM (as of April, 1995)

Figure 3.1-3

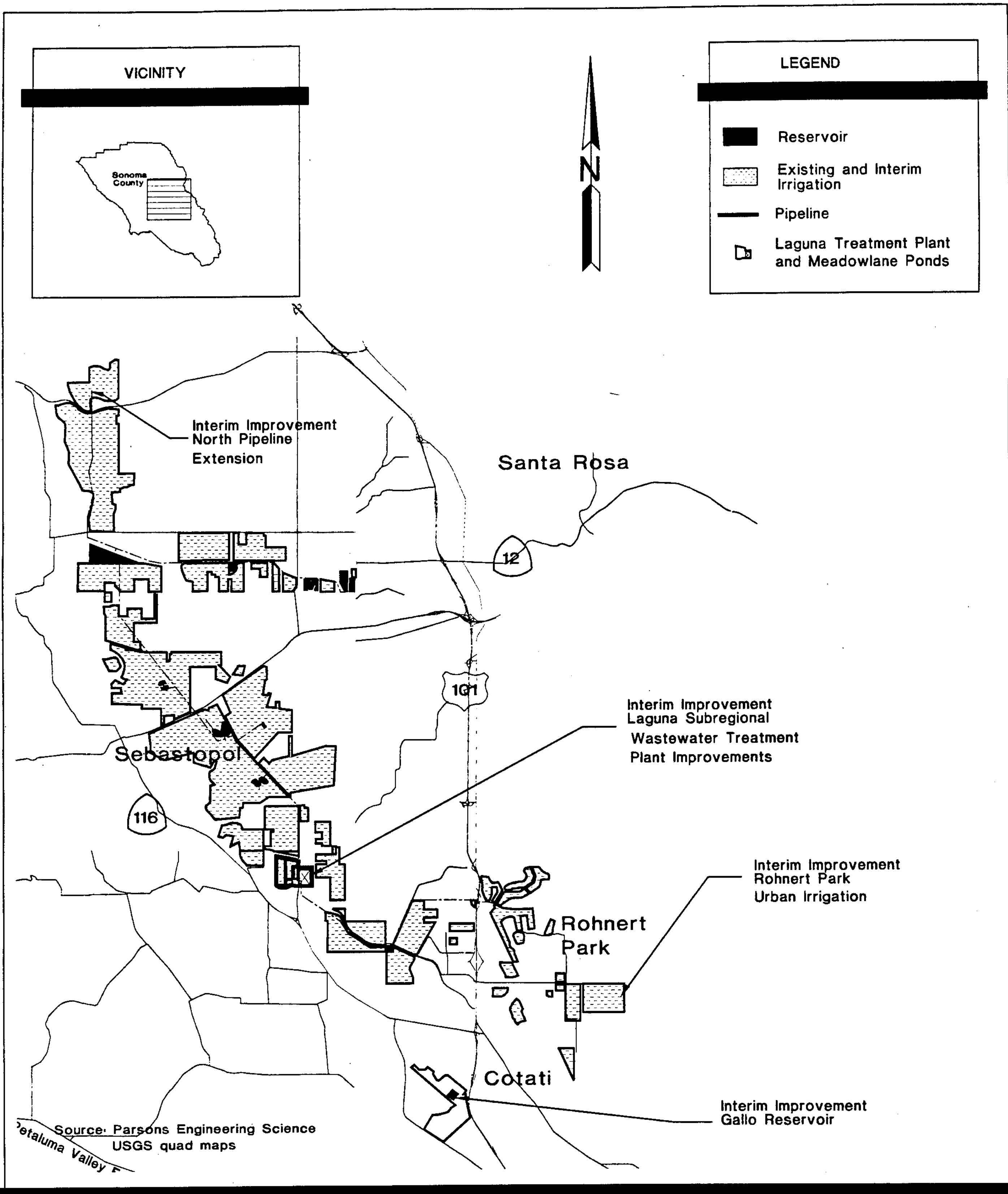


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Figure 3.1-4

INTERIM IMPROVEMENTS

Additional production of sludge will also occur. The impacts of disposing of this increased sludge production are addressed in the Santa Rosa Subregional Sludge Beneficial Use Project Environmental Impact Report (LSA 1991).

ALTERNATIVE 2 - SOUTH COUNTY RECLAMATION

The South County Reclamation Alternative focuses on the use of reclaimed water for agricultural irrigation in areas south and east of Santa Rosa (see Figure 3.1-5). The projected reclaimed water flow from the Laguna Plant will be 21 mgd average dry weather flow, and the design discharge rate to the Russian River will be 1% of river flow; however, a discharge rate of between 1% and 20% of river flow may also be considered under this Alternative as described in the *Range of Discharge Evaluation* (Harland Bartholomew & Associates, Inc. 1996). Discharge will occur at existing discharge locations (Delta and Meadowlane Ponds).

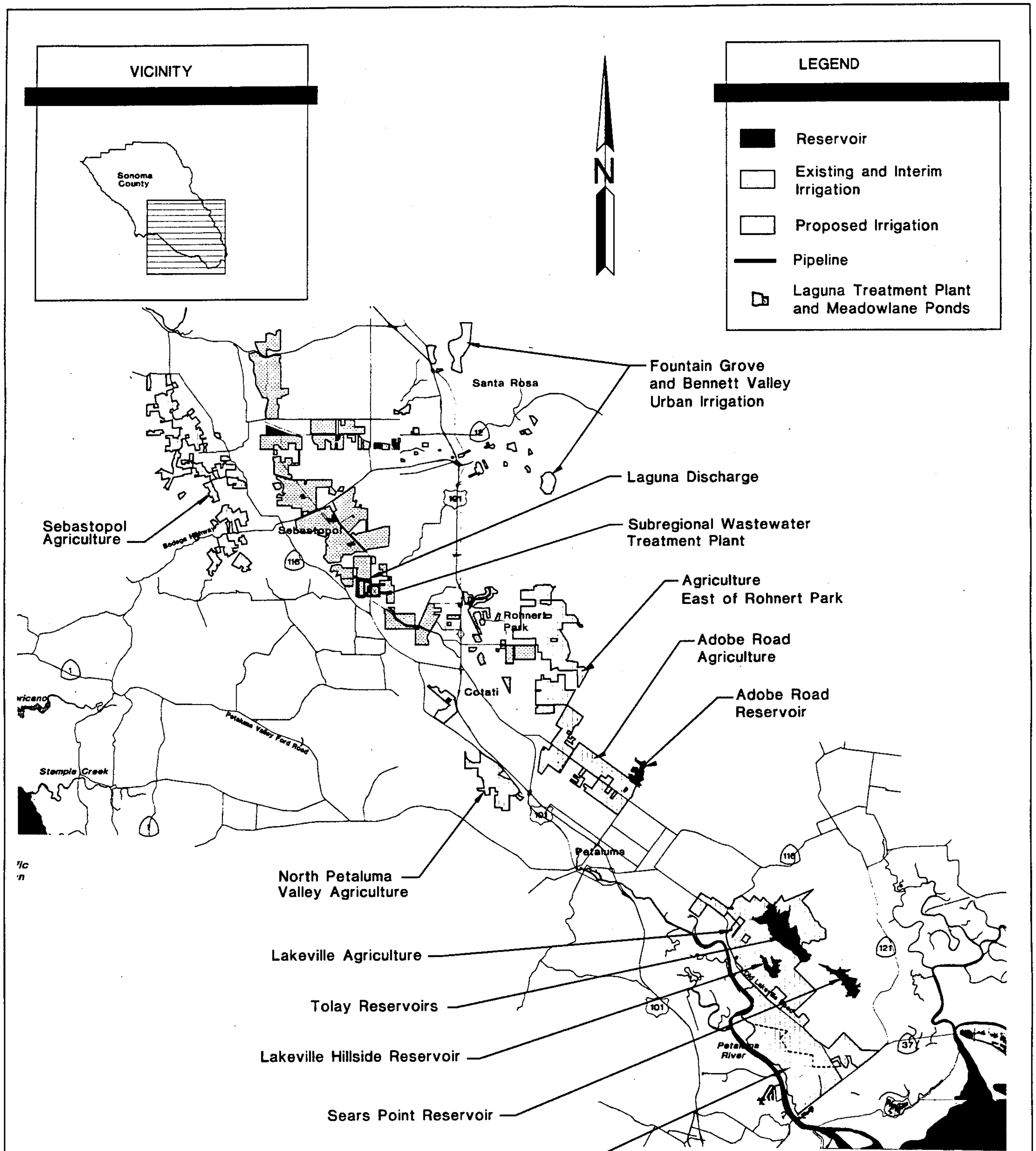
Within Alternative 2, four subalternatives have been defined. These subalternatives differ principally in the location of the proposed storage facilities for reclaimed water to be used in agricultural irrigation. The subalternatives with their associated storage facilities are:

- Subalternative 2A - Reservoir Site: Tolay Extended;
- Subalternative 2B - Reservoir Sites: Adobe Road and Lakeville Hillside;
- Subalternative 2C - Reservoir Site: Tolay Confined; and
- Subalternative 2D - Reservoir Sites: Sears Point and Lakeville Hillside.

Principal Project components which are common to all four subalternatives are:

- Expansion of the influent pumping capacity at the Laguna Plant;
- Urban irrigation projects in the Fountaingrove and Bennett Valley areas;
- A transport system, consisting of transmission pipelines and pump stations, to carry the reclaimed water to storage and irrigation sites; and
- Potential agricultural irrigation areas west of Sebastopol, east of Rohnert Park, in the Adobe Road and Lakeville areas, north of Petaluma, and in the bay flats west of Lakeville Highway.

The components which comprise Alternative 2 are more fully described in Section 3.3.



Source: Parsons Engineering Science
USGS quad maps

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ALTERNATIVE 2
SOUTH COUNTY RECLAMATION

Figure 3.1-5

ALTERNATIVE 3 - WEST COUNTY RECLAMATION

The West County Reclamation Alternative focuses on the use of reclaimed water for agricultural irrigation in areas west of the Laguna de Santa Rosa (see Figure 3.1-6). The projected reclaimed water flow from the Laguna Plant will be 21 mgd average dry weather flow, and the design discharge rate to the Russian River will be 1% of the river flow; however, a discharge rate of between 1% and 20% of river flow may also be considered under this Alternative as described in the *Range of Discharge Evaluation* (see Appendix A, Harland Bartholomew & Associates, Inc. 1996). Discharge will occur at existing discharge locations.

Within Alternative 3, five subalternatives have been defined. The subalternatives with their associated storage facilities are:

- Subalternative 3A - Reservoir Site: Two Rock;
- Subalternative 3B - Reservoir Site: Bloomfield;
- Subalternative 3C - Reservoir Site: Carroll Road;
- Subalternative 3D - Reservoir Site: Valley Ford; and
- Subalternative 3E - Reservoir Site: Huntley.

Principal Project components which are common to all five subalternatives are:

- Expansion of the influent pumping capacity at the Laguna Plant;
- Urban irrigation projects in the Fountaingrove and Bennett Valley areas;
- A transport system, consisting of transmission pipelines and pump stations, to carry the reclaimed water to storage and irrigation sites; and
- Potential agricultural irrigation areas west of Sebastopol and in the Stemple and Americano Creek areas.

The components which comprise Alternative 3 are more fully described below in Section 3.3.

ALTERNATIVE 4 - GEYSERS RECHARGE

The Geysers Recharge Alternative provides for transmission of reclaimed water from Delta Pond, located south of Guerneville Road to the geysers, located northeast of Healdsburg, for injection and recharge of the geysers steamfield currently used as a source for geothermal energy. The projected reclaimed water flow from the Laguna Plant will be 21 mgd average daily weather flow, and approximately 75% of the total reclaimed water will be used for recharge at the geysers. The remaining 25% will be used for irrigation. This Alternative will involve discharge to the Laguna de Santa Rosa only during peak wet weather events at a maximum rate that will not exceed 1% of Russian River flow, and no additional storage or irrigation is proposed (see Figure 3.1-7).

Expansion of the influent pumping capacity at the Laguna Plant is also a component of Alternative 4.

Under this Alternative a reduction of 2,000 acres in existing agricultural irrigation acreage will be accomplished through attrition under current procedures for the Reclamation System and is not evaluated as part of this EIR/EIS. Non-renewal of irrigation contracts now occurs within the system and under this Alternative, the City of Santa Rosa will not replace contracts which are not renewed, rather than seeking to obtain new contracts.

The components which comprise Alternative 4 are more fully described below in Section 3.3.

ALTERNATIVE 5 - DISCHARGE

This Alternative provides for the discharge of reclaimed water to the Russian River at a design discharge rate of up to 20 % of river flow. Under Alternative 5, the projected reclaimed water flow from the Laguna Plant will be 21 mgd average dry weather flow, and no additional reuse or storage of reclaimed water will be required (see Figure 3.1-8).

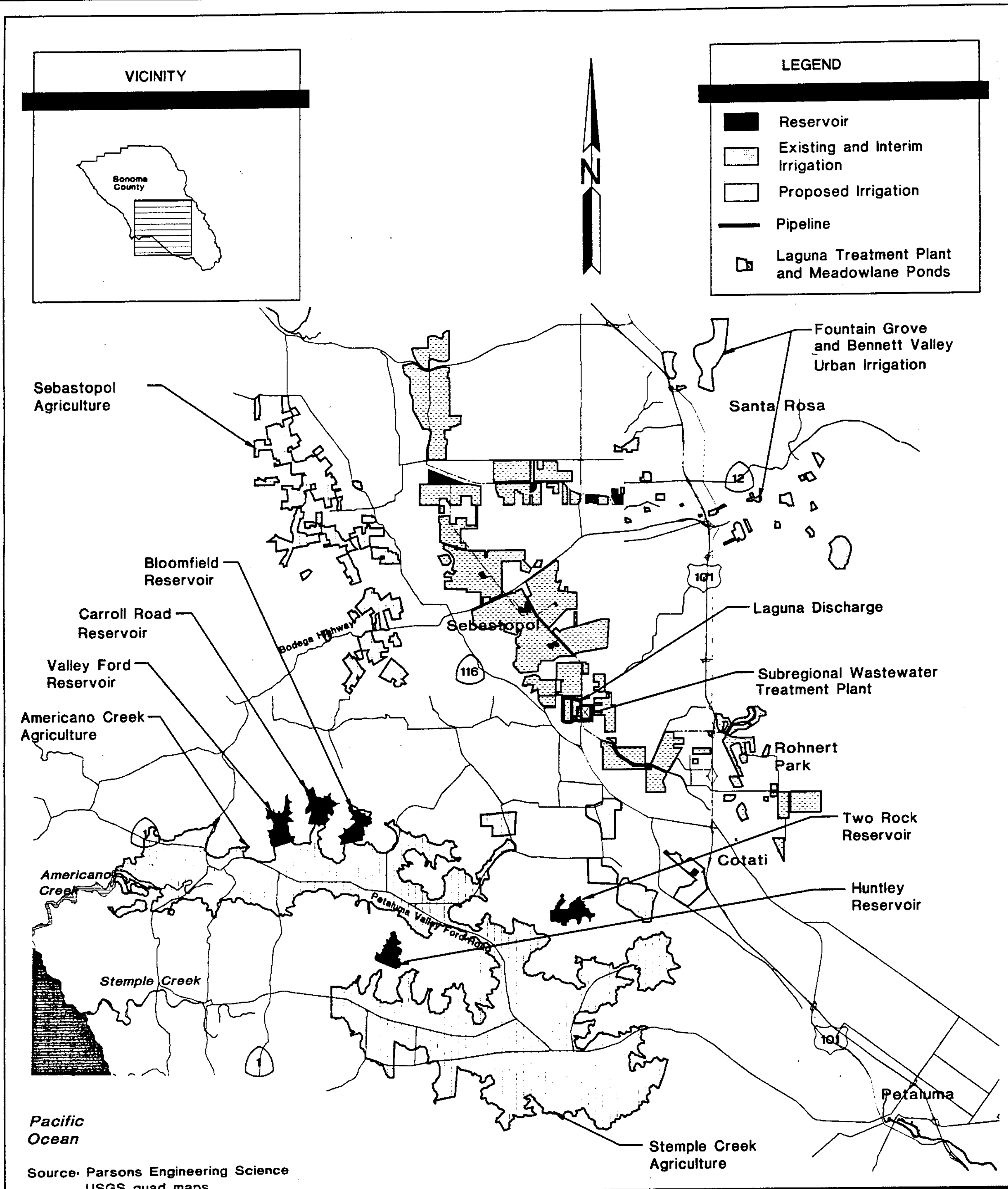
Within Alternative 5, two subalternatives have been defined. These subalternatives differ principally in the location at which discharge to the Russian River will take place. The subalternatives are:

- Subalternative 5A - Transmission of reclaimed water and discharge to the Russian River at a location above the Sonoma County Water Authority intakes;
- Subalternative 5B - Discharge of reclaimed water to the Laguna de Santa Rosa at the existing discharge locations.

Under the 20% design discharge rate for Subalternative 5A, minor amounts of reclaimed water may also be discharged to the Laguna at the existing discharge locations.

Also included in Alternative 5 is expansion of the influent pumping capacity at the Laguna Plant.

The components which comprise Alternative 5 are more fully described below in Section 3.3.



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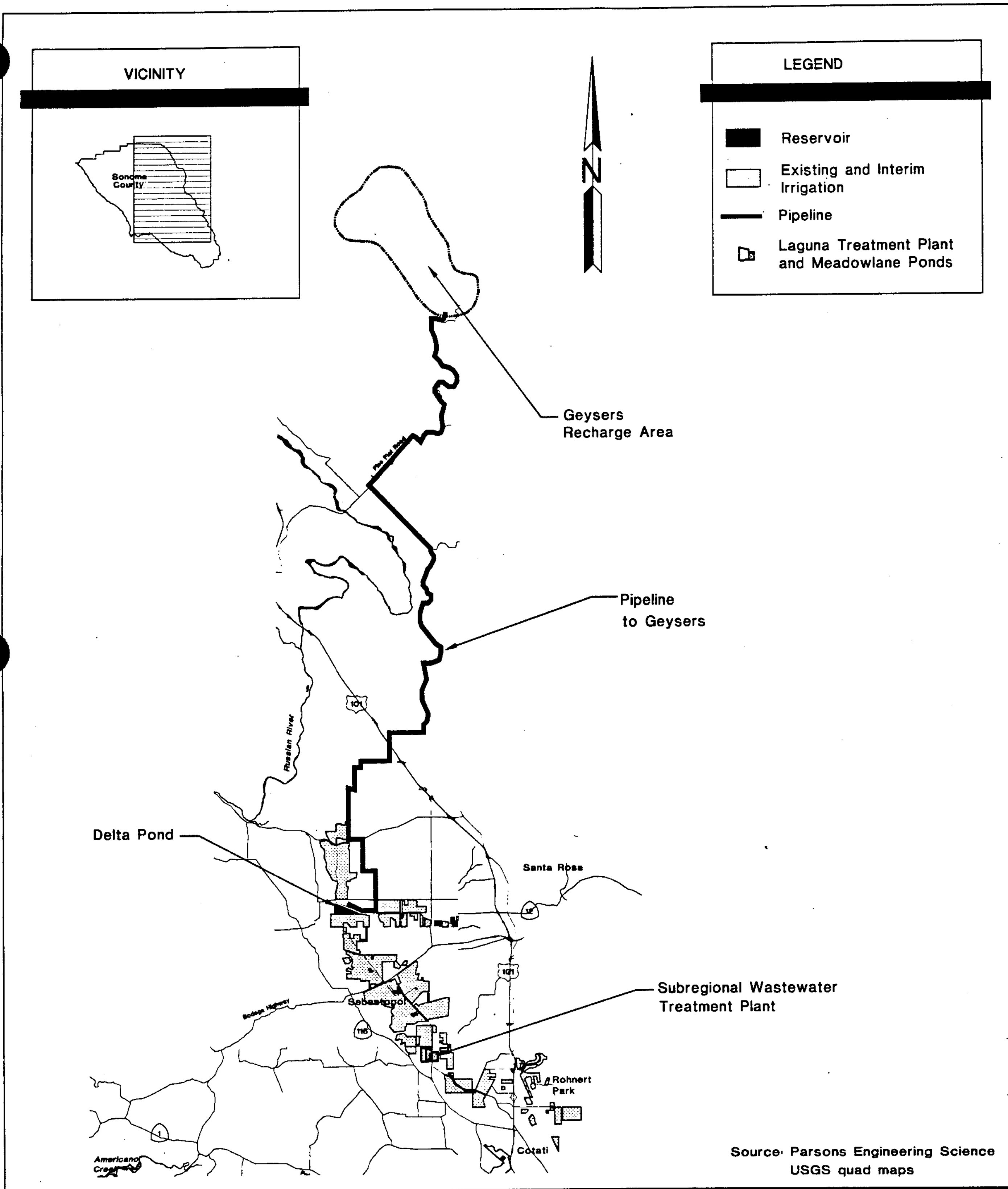
ALTERNATIVE 3 WEST COUNTY RECLAMATION

Figure 3.1-6



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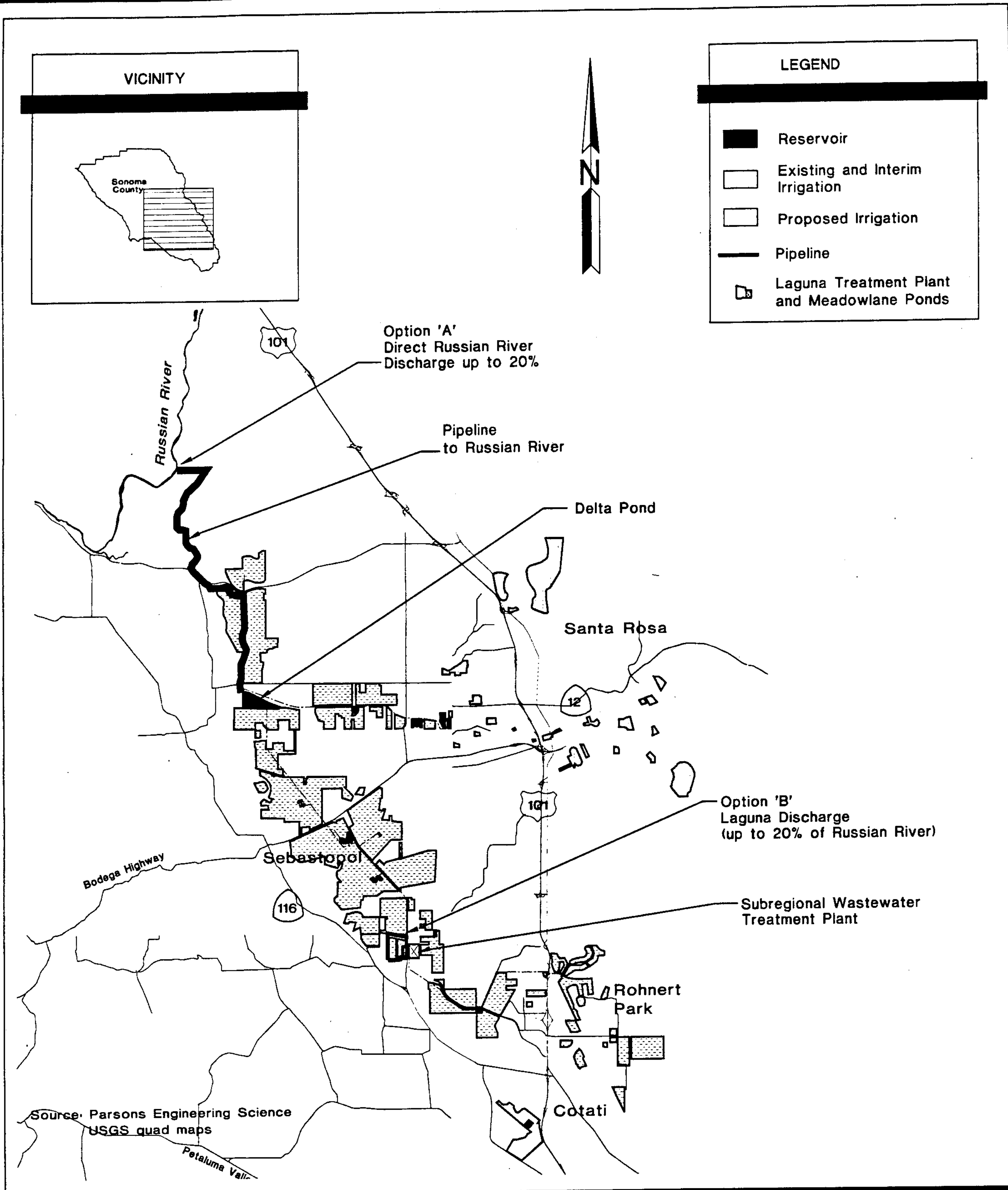
ALTERNATIVE 4
GEYSERS RECHARGE

Figure 3.1-7



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Wastewater Project

ALTERNATIVE 5
20% MAXIMUM
RUSSIAN RIVER DISCHARGE

Figure 3.1-8

ALTERNATIVES AND COMPONENTS CONSIDERED AND REJECTED

During the development of alternatives, a wide range of discharge and reuse options were considered in order to develop a practicable Project that could reliably manage reclaimed water. The selected alternatives described above include conservation, agricultural irrigation, urban reuse, reuse at the geysers, and discharge to the Russian River. In developing the proposed alternatives, an extensive screening of components was performed. The results of this screening were presented in the Santa Rosa Subregional Long-Term Wastewater Screening Report (Harland Bartholomew & Associates, Inc. 1994).

Evaluation Criteria for Screening of Alternatives and Components

A primary consideration in the screening of alternatives and components was the ability to accomplish the purpose and need of the Project. Once a component was determined to achieve the Project's purpose and need, practicability and logistics were the primary considerations in development of alternatives. The following factors were considered in the evaluation of potential Project components and alternatives.

- Purpose and Need. Project components were evaluated in terms of their ability to provide reliable wastewater disposal in a manner that maximizes reclamation and reuse and optimizes water conservation as defined by the Project purpose and need contained in Section 1.1 of this document.
- Cost. The costs of Project components and alternatives were considered, along with financing options for the Project. Both capital costs and operations and maintenance costs were estimated and used in the evaluation.
- Technology. The evaluation considers the technology to construct and operate the new components of the Subregional System. To ensure reliability of the system it is critical that the technology be proven, readily manageable, and sustainable.
- Logistics. Logistical factors include physical constraints on Project implementation. Physical constraints include site suitability and location.

Alternatives and Components Not Carried Forward

Based upon the evaluation of components and alternatives in the Screening Report, the following components were not carried forward as part of the Project alternatives for analysis in the EIR/EIS.

Maximum Water Conservation

Maximum conservation was not carried forward because it is unreliable and therefore does not meet the Project purpose and need. Maximum conservation goes beyond proven technologies to include greywater use for residences, composting toilets, electric toilets, and other social and behavioral changes to

reduce wastewater production. The technologies for greywater, composting toilets, and electric toilets are relatively new, and have mostly been used in rural and recreational areas. Use in urban areas may be problematic and is as yet unproven. Other conservation methods are not technology based, but rely on changing behavior (e.g., shorter showers, reduced toilet flushing, reduction in water use in kitchen and bathroom sinks). Behavioral-based conservation efforts do not provide adequate reliability of flow reduction. The Subregional System must operate reliably under all conditions and thus cannot rely on behavioral changes to guarantee reductions in wastewater flow. In addition, there are physical constraints to the use of some technologies in urban areas. Small lots and multifamily dwellings have inadequate land area for greywater systems. Soils in the Santa Rosa area are not amenable to construction of greywater systems. Because of these constraints, the City of Santa Rosa voted on May 23, 1995 not to adopt the proposed state regulations for greywater systems, and have prohibited the construction of such systems in the City. There are also regulatory constraints to the use of composting toilets, which are not currently approved by the Sonoma County Health Department.

Stream Flow Augmentation

This component was not carried forward because it does not meet Project capacity needs and because of high long-term management costs which rendered it infeasible. Flow augmentation considered summer discharge of reclaimed water to Americano and Stemple Creeks in the West County as well as various South County streams including the Petaluma River, Lichau Creek, Copeland Creek and Lynch Creek to augment natural dry season flows, and although it could provide a beneficial reuse of water, it makes a relatively small contribution to the central purpose of wastewater disposal. Also, costs of studying flow augmentation streams before and after implementation of a flow augmentation program could exceed the minor benefit associated with this type of reuse. Long-term monitoring requirements might entail substantial costs, which could be on the order of $150,000 per year or $3,000,000 over the life of the Project.

Decentralized Treatment Systems

This alternative was not carried forward because it will not provide additional reuse or other disposal capacity for reclaimed water and therefore does not meet the Project purpose and need. Decentralized Treatment Systems include construction of new wastewater treatment systems by the various Subregional entities: Cotati, Rohnert Park, Sebastopol, and South Park Sanitation District. This will take the place of expansion of the Laguna Wastewater Treatment Plant. Cost of construction of new treatment plants will be substantial and will have to be added to the cost of increasing wastewater disposal capacity. In addition, new treatment systems will not solve the basic problem facing the Subregional System, which has adequate ability to treat wastewater but is lacking disposal capacity.

Central Valley Irrigation/Storage

This alternative was not carried forward because of high costs and logistical problems which will make implementation of this alternative infeasible. This alternative includes construction of a pipeline to transport reclaimed water to the Central Valley for irrigation. Construction of a storage reservoir in the irrigation area will be necessary. While it will be possible to construct and operate a Central Valley irrigation system, the logistics of managing 60 miles of pipeline and operating a remotely-located reclamation system make this alternative infeasible. This alternative will still require construction of a major storage reservoir and it is certain the reservoir will have wetland/riparian impacts similar to those associated with Sonoma County reservoir locations.

San Pablo Bay Discharge

This alternative was not carried forward because of inability to fulfill the Project purpose and need. This alternative will include a variety of potential discharges to San Pablo Bay, either through a deep or shallow bay outfall or through the Petaluma River. All of these options were associated with a South County irrigation alternative. San Pablo Bay discharge will constitute a significant method of wastewater disposal but will be limited to the rainy season, and does not achieve the Project purpose of reuse or water conservation.

Ocean Discharge

This alternative was not carried forward because it does not meet the Project purpose and need. This alternative will discharge wastewater directly to the ocean near Salmon Creek. This area is just north of the Gulf of the Farallones Marine Sanctuary, which is an Area of Special Biological Significance. An ocean outfall will allow year-round disposal of wastewater and will meet all of the disposal requirements of the Subregional System. However, this alternative does not achieve the purpose of maximizing reclamation or optimizing water conservation, and therefore will not fulfill the purpose and need for the Project. There are also physical constraints to outfall construction. Construction of an ocean outfall will involve considerable construction-period disruption to both the marine environment and to coastal areas adjacent to the outfall. Construction of the pipeline to the outfall will cross coastal areas where pipeline construction will be difficult. Pipeline construction will disrupt both coastal dune habitat and narrow roads in residential areas.

Lake Sonoma Discharge

This alternative will pipe reclaimed water to Lake Sonoma for discharge. It will effectively be equivalent to a 20% Russian River discharge because Lake Sonoma empties into the Russian River; only the location of the discharge will be different. Because of pumping costs, annual operations and maintenance costs for this options will be relatively high, at about $5 million per year. These costs are

considerably higher than a 20% discharge direct to the Russian River. Environmental effects of constructing a new pipeline to Lake Sonoma will also be greater than maintaining the existing discharge to the Russian River. Because there are no environmental benefits to be gained by changing the location of discharge to a point far upstream, this option was deemed unreasonable and not appropriate for further consideration.

Community Separator Wetlands

This component was not carried forward due to logistical constraints which render the component infeasible. Community separator wetlands were proposed during public workshops as a method for storing reclaimed water while providing open space between Santa Rosa and surrounding communities. Although wetlands will not provide significant amounts of storage, it was initially agreed to evaluate this component in one of the Project alternatives because wetlands consume wastewater, provide a land use benefit, and may also be used for polishing wastewater, that is removing nitrogen from the water. However, after extensive research it was determined that suitable sites for community separator wetlands were not available because significant impacts on oak woodlands and vernal pools will result.

To achieve the necessary acreage for water use and polishing, between 500 and 1,200 acres of wetlands will be needed. The criteria for acceptable sites required areas containing no oak woodland habitat or valuable vernal pool wetlands. Sites which are part of the existing Subregional irrigation system were not considered suitable because they already consume wastewater and are mostly operated by property owners with long-term contracts for irrigation. The search for appropriate sites was confined to parcels of 20 acres or larger because of the substantial acreage of wetlands required and the desire to create larger areas of contiguous wetlands. No suitable land was found within the community separator areas suggested by the public during Project workshops. The search was extended beyond this area, and only two suitable parcels were found, one of which was already in the existing irrigation system.

The two functions of constructed wetlands, use of reclaimed water and removal of nitrogen, can be served by other Project components. Reclaimed water use by irrigation is slightly more cost effective, and nitrogen removal can be accomplished within the wastewater treatment plant. Because the community separator wetlands were the only unique component of the Community Separator/South County Reclamation Alternative, this alternative was dropped from the list of alternatives to be evaluated in the EIR/EIS. All of the other components of the alternative are included in other alternatives, specifically in the South County Reclamation Alternative.

Rapid Infiltration

This component was not carried forward due to logistical constraints. The component will involve construction of rapid infiltration beds in the gravel soils along the Russian River as a means of discharging reclaimed water to the River. From a regulatory standpoint, this component will be considered a direct discharge to the River, even though the water passes through soils prior to entering to the River. Physical constraints to this option include the lack of sufficient Cortina (gravel) soils on the east bank of the Russian River. Use of Cortina soils significantly upstream or on the west bank of the River will prove costly from both a construction and operations and maintenance standpoint.

On-Farm Storage Ponds

This component was not carried forward because the acreage requirement for individual on-site storage ponds for each user of reclaimed water will be approximately one-fourth of the total farm acreage, drastically reducing the area of productive farmland. This will make on-farm storage unfeasible for typical agricultural users. In addition, the logistics of water management under a multiple pond system are problematic, because each user will manage their own storage and water demand, without the ability to draw water from other areas during times of high demand. These factors have made it extremely difficult to manage the existing small ponds in the Subregional System.

Storage Tanks

Use of this component for the necessary 4,500 MG of storage will require the construction of between 500 and 900 tanks, which will cost over $2 billion, well beyond the ability of the Subregional System to fund. The logistics of siting, constructing and operating this many tanks will be virtually impossible.

Aquifer Storage and Recovery (ASR)

This component was not carried forward due to technological and logistical constraints. Wastewater injection into a potable aquifer and recovery from that aquifer is not yet proven technology. Although injection of reclaimed water for groundwater recharge has been practiced for some time, projects of this type are based upon the principle that groundwater is further treated by natural processes as it moves from the point of injection to the point of removal. This is different than ASR, which uses the aquifer only for temporary storage, injecting and removing reclaimed water at the same location, without affecting the native groundwater.

Also, preliminary modeling efforts have shown that aquifer characteristics are only marginally suitable for ASR. Two study areas were evaluated. The most important parameter determining suitability of the area is its specific capacity, which expresses how well water can be moved in and out of the aquifer. The

minimum long-term injection specific capacity for a feasible ASR Project is 5 gallons per minute per foot (gpm/ft). Studies by CH2M Hill have shown that Study Area 1 has a specific capacity of 6 gpm/ft, but Study Area 2 has a specific capacity of only 1.5 gpm/ft. This indicates that ASR will not be feasible in Study Area 2.

Specific capacity of Study Area 1 is marginal, and considerable additional testing will be required to determine whether ASR will work for the Project area. Tests will need to include pump tests to further delineate aquifer characteristics, followed by trial injection of potable water to measure migration and recovery of the injected water. Finally, a pilot Project for injection of reclaimed water will need to be conducted before a full-scale ASR Project could be approved.

The regulatory framework for ASR is uncertain. The California Department of Health Services has draft guidelines for groundwater recharge with reclaimed water, but has not developed guidelines for permitting ASR projects. Given that the North Coast Regional Water Quality Control Board has mandated an aggressive schedule for selection of a long-term wastewater Project, there is not enough time to fully demonstrate the performance of ASR and resolve the regulatory issues allowing permitting of this component.

Chileno Valley Irrigation

This potential irrigation area, located southwest of Petaluma along Chileno Creek, was eliminated from further study because the relative lack of landowners interested in reclaimed water resulted in a lack of adequate available land and relatively high cost for pipeline construction.

Schellville Irrigation

This potential irrigation area, generally located north of Highway 37 and east of Highway 121, was eliminated from further study because it is traversed by the Napa Slough system creating logistical problems associated with the extensive wetlands in this area. Also, large portions of this area are used for the Vallejo Sanitary District biosolids management program.

A discussion of the alternatives and components considered and rejected, including the Community Separator/South County Reclamation Alternative is contained in the Technical Memorandum, *Documentation in Support of the Elimination of Alternatives* (Parsons Engineering Science, Inc. 1996a).

3.2 EXISTING SYSTEM WITH INTERIM IMPROVEMENTS

The Santa Rosa Subregional Water Reclamation System utilizes wastewater treated and reclaimed at the Laguna Plant. The plant has a design capacity of 18 million gallons per day (average dry weather flow or ADWF) and serves the cities of Santa Rosa, Rohnert Park, Cotati, and Sebastopol, and the South Park County Sanitation District, located south of the City of Santa Rosa. The System disposes of reclaimed water by means of a combination of methods, including discharge to the Russian River via the Laguna de Santa Rosa, urban irrigation, created wetlands in the Santa Rosa Plain, and agricultural irrigation. The System treats the solids removed from the wastewater (sludge) and the resulting sludge is applied to agricultural lands or disposed of at the Sonoma County Central Landfill. The principal components of the existing system and interim improvements now under construction are described in the following sections. The existing system along with the interim improvements described in this section are considered part of the No Action (No Project) Alternative.

LAGUNA SUBREGIONAL WASTEWATER TREATMENT PLANT

The Laguna Plant is located on Llano Road, in the Santa Rosa Plain, west of the City of Santa Rosa and adjacent to the Laguna de Santa Rosa. The plant is an activated sludge and tertiary treatment plant. The plant is designed to treat 18 million gallons per day (mgd) ADWF.

RECLAIMED WATER STORAGE

The reclamation system includes a series of storage ponds, which are connected through pipelines to the Laguna plant and to transmission pipelines supplying the irrigation system. Total available storage is approximately 1,500 million gallons (MG). Reclaimed water storage is targeted to meet reuse needs (irrigation contracts) and at the end of the irrigation season in September, the operational target is to essentially empty the storage ponds. Increases in reclaimed water storage occur in the fall when the irrigation demand decreases and the water flow in the Russian River is too low to allow discharge to the River. During discharge months (October to May 14th) reclaimed water storage is managed to meet a target storage curve and reclaimed water is discharged to the River when storage volume exceeds the curve. Reclaimed water storage is increased in the spring to provide adequate water for reuse during the summer irrigation season.

RECLAIMED WATER DISPOSAL AND REUSE

Disposal and reuse of reclaimed water is through agricultural and urban irrigation, operation of wetland areas, and discharge to the Russian River via the Laguna de Santa Rosa.

Irrigation

The existing reclamation system is composed of a large network of pipelines, pump stations, and storage ponds that distributes the reclaimed water to approximately 5,300 acres of irrigated land (see Figure 3.1-3). Both agricultural and urban irrigation sites are included in the system, although the majority are in agricultural use. During the irrigation season, typically from April through October, reclaimed water comes directly from the Laguna Plant, supplemented by water stored in ponds. (There is also a Winter Irrigation Program which can be implemented when weather during the winter season is dry and less water than expected can be discharged to the Laguna). Peak monthly irrigation volumes typically occur in June, July, and August at rates between 4.5 and 5.5-inches of water per month per acre. During this peak season, up to 35 MG per day may be pumped through the system for irrigation use.

Wetlands

The reclamation system has operated and managed two wetland areas that use reclaimed water. These are the Kelly Farm demonstration wetland, constructed in 1992, and the LaFranchi marsh. The wetlands are supplied with reclaimed water from the Laguna Plant and are monitored as part of the demonstration Project. An additional wetland area was developed in 1995-6 as described below in the Interim System Improvements

Discharge to the Russian River

Reclaimed water which is not stored or directly conveyed for irrigation or wetlands use is discharged to the Russian River via the Laguna de Santa Rosa in compliance with the System's permit from the North Coast Regional Water Quality Control Board. Treated wastewater may be discharged to the Laguna de Santa Rosa from numerous points. The two principal discharge locations are at the Meadowlane Ponds west of Llano Road and at Delta Pond, located south of Guerneville Road. The actual volume and frequency of discharge at any given location varies due to operational and seasonal considerations, including irrigation needs, storage levels, and weather.

Ordinarily, discharge is limited to a maximum of 1% of river flow. Discharge is increased to 5% of river flow when required (with the permission of the North Coast Regional Water Quality Control Board) between October 1st and May 14th. However, due to limited storage and a combination of weather conditions that may occur during this period, the Subregional System currently has the potential to exceed the legal maximum

discharge to the Russian River. These conditions, although infrequent, occur during winters characterized by periodic light rain and overall drier-than-normal conditions.

During very high flow events the hydraulics of the system preclude discharge, and the gates are opened to allow water to flow into the ponds which are emptied as flood waters subside.

SLUDGE DISPOSAL

Disposal of sludge generated as a by-product of treatment processes at the Laguna Plant is accomplished through trucking of the waste to the Sonoma County Central Landfill on Meacham Road, the Redwood Landfill near Novato, and through land application of sludge at sites in the Santa Rosa Plain and along Lakeville Highway south of Petaluma under the Biosolids Beneficial Reuse Project. In 1994, approximately 35 percent of the total sludge generated by the Laguna Plant was used in land application. The Subregional System Compost Facility will substantially reduce the amount of biosolids being landfilled and is scheduled to be operational in Fall 1996.

WATER CONSERVATION

The member entities of the Santa Rosa Subregional Water Reclamation System have existing water conservation programs which may consist of water audits; aggressive enforcement of water conservation laws; metering; and rebate and retrofit programs. Additional information about water conservation in the Subregional System may be found in the Technical Memorandum, *Wastewater Flow Projections* (West Yost 1996). Conservation programs include:

- Implementation of water audit programs. Santa Rosa has both a residential and a non-residential (commercial, industrial and institutional uses) audit, which identifies ways that individual water users can reduce their water use.
- Enforcement of the State of California conservation fixtures laws. State of California legislation includes maximum flow standards for new shower heads and faucets, and requires Ultra-Low-Flow Toilets.
- Metering of water services. Santa Rosa and Sebastopol meter all services with a commodity rate price structure. Cotati meters all services, and Rohnert Park meters all services except single-family residences.
- Rebate and retrofit programs. In 1992-1993, Santa Rosa participated in an evaluation of low-flow fixtures and provided test sites for a pilot toilet retrofit Project. Santa Rosa also has a shower head exchange program. In 1992, Rohnert Park developed and implemented a toilet retrofit and low-flow shower head replacement program, although the program will be concluded soon due to decreased demand. As part of the approval for construction of each new dwelling unit, Cotati collects a fee used to retrofit four existing dwelling units. Sebastopol

has a toilet rebate program, and has conducted a mass-mailing of conservation kits to promote efficient water use.

The Santa Rosa Board of Public Utilities has formed a Technical Committee to evaluate developing water conservation technologies and bring recommendations to the Board as these technologies become practicable.

In addition, the Sonoma County Water Agency, which supplies water to Santa Rosa, Rohnert Park, and Cotati, has provided water conservation information and education to its customers. Most of these conservation programs are directed toward public information for motivating voluntary customer conservation. For example, conservation kits are made available that help customers detect leaks in toilets and incorporate water saving behavior into daily routines.

INDUSTRIAL WASTE PRETREATMENT

The Santa Rosa Subregional Water Reclamation System has an active Industrial Waste Division that implements the U.S. Environmental Protection Agency (EPA)-approved Industrial Wastewater Pretreatment Program. This program, by requiring the pretreatment of certain wastes to eliminate or reduce the amounts of pollutants such as organic polymers, silver, and heavy metals entering the collection system, reduces the concentration and loading of such pollutants in the treatment system. The Laguna Plant's Pretreatment Program includes minimizing pollutants of concern; permitting and monitoring when applicable; enforcing pretreatment regulations; and sampling industrial/commercial pollutant discharge as well as background domestic pollutant data.

INTERIM PERIOD SYSTEM IMPROVEMENTS

During the period 1995-1996, additional improvements have been constructed to improve the reliability of the reclamation system prior to implementation of the Long-Term Wastewater Project. These improvements, as shown in Figure 3.1-4, and discussed below are considered to be part of the No Action (No Project) Alternative.

Additional improvements planned but not approved, such as the expansion of the Sludge Beneficial Use Project, are included as Cumulative Projects, Section 3.5. They are not part of the interim improvements identified here.

Laguna Advanced Treatment Upgrade Project

The Laguna Advanced Treatment Upgrade Project provides improvements necessary to maintain reliable treatment of currently permitted flows in compliance with existing standards for water and biosolids quality. All improvements are to be constructed within the existing Laguna Plant site on the east side of Llano Road, north of the Laguna de Santa Rosa.

The Upgrade Project will not increase the overall permitted capacity of the Laguna Plant, currently at 18 mgd ADWF. The existing influent pumps, which limit overall plant capacity, will not be changed under the Advanced Treatment Upgrade; expansion of the influent pumping capacity is considered part of the Long-Term Wastewater Project Alternatives 2, 3, 4, and 5.

The major improvements in the Advanced Treatment Upgrade include:

- Replacement of existing comminutors, which shred larger material in the influent at the headworks with bar screens;
- Construction of new secondary treatment aeration basins (which will have the incidental benefit of reduced nitrate/nitrogen in reclaimed water, from 16.3 mg/L at least to 14 mg/L), along with an additional clarifier;
- Construction of new filter cells and a permanent ammonia feed system;
- Construction of additional sludge disposal facilities including an anaerobic digester, gas mixing compressors and a third gravity belt thickener; and
- Construction of co-generation facilities using methane gas generated by the digestion process.

Individual process units may have greater capacity due to standard equipment sizes or the need for uniform sizes of multiple structural units (for efficient construction, operational practicality, and exchangeability of parts). However, these will not increase the overall capacity of the plant, which will remain at 18 mgd ADWF.

Irrigation System Improvements

The North Pipeline Extension in the Santa Rosa Plain and an urban irrigation Project in Rohnert Park were completed in 1995-1996 under the Interim Period Reclamation System Master Plan.

The North Pipeline Extension, running approximately 7,600 feet of pipeline north from the existing Denner Ranch pump station, adds the capability of irrigating approximately 150 acres and has the capacity to supply an additional 100 acres in the future (see Figure 3.1-4). Also, a new North Booster pump station located at the south end of the pipeline extension replaced the existing Denner Ranch pump station.

The Rohnert Park Water Reuse Project, constructed during 1995, adds 18 parks, schools, and other open landscape sites covering a total of 280 acres to the existing water reuse system (see Figure 3.1-4). The Project allows delivery of reclaimed water from the Laguna to previously irrigated sites, replacing the use of potable groundwater. The Project included a new pump station adjacent to Poncia Pond, a new trunk pipeline extending to the eastern part of Rohnert Park, and lateral pipelines to the 18 irrigation sites.

An additional irrigation Project, the West Cotati Reclamation Pipeline Project, has been approved by the Board of Public Utilities, and will carry reclaimed water to the Gallo property, located west of Cotati between Highway 101 and Stony Point Road, for the irrigation of a vineyard. The property will provide its own storage, which the proponent will construct. The vineyard is expected to utilize 80 MG of reclaimed water per year. This Project will preclude the need for additional storage or disposal to meet the Regional Water Quality Control Board permit requirements during the interim period prior to construction of an approved Long-Term Project.

Sludge Composting Facility

Under the Santa Rosa Subregional Sludge Beneficial Use Project, a new sludge composting facility was completed in early 1996. The composting facility site, located at the Meadowlane Ponds, is six acres in size and the facilities include a structure to house an agitated bed composting system, along with a covered receiving/mixing/loading area.

Laguna Joint Wetland Project

An additional wetland Project is located on the southerly portion of the Laguna Plant property. This Project, jointly developed with the County of Sonoma, is has a reclaimed water pond and other site enhancement features similar to the previously implemented Kelly Demonstration Wetland Project.

3.3 DESCRIPTION OF PROJECT COMPONENTS

The five Project alternatives include numerous Project components. These components are the individual elements or building blocks that make up the system proposed to accomplish the Project objective of beneficial reuse of reclaimed water. This reuse is accomplished under the alternatives by three principal means: use of reclaimed water for agricultural and urban irrigation; use of reclaimed water for recharge of the geysers steamfield; or discharge of reclaimed water to either the Laguna de Santa Rosa or the Russian River. Some Project components, such as pipelines, are common to virtually all alternatives, while others such as reservoirs or the geysers steamfield may be part of only one or two alternatives. Project components are described in the following sections. Table 3.3-1 identifies the Project components associated with each Project alternative. The *Alternative Project Facilities Plans*, contain the preliminary engineering designs for the Project components (See Appendix D-32).

The analysis of environmental consequences (impacts) contained in each section of Chapter 4 of this document is organized by component, and with the same sequence in the discussion of component impacts for each section. This has been done to facilitate the comparison of impacts by the components which make up each alternative, and allow a better understanding of which components contribute to which impacts. This organization and structure also recognizes that, in the selection of a Project, there are options available for certain components. For example, in the selection of the agricultural irrigation component under alternatives 2 and 3, the Sebastopol irrigation areas may or may not be included, while the extent of other irrigation areas may be modified. This would also mean that certain segments of pipelines and pump stations would not be required. The analysis by component allows the impacts associated with these individual components to be analyzed during Project selection in relation to other options, but also to the total impacts for an alternative.

All Project components would comply with the following design measures, and thus each measure is a part of the Project. Each measure is described in full in Section 2.2.:

- 2.2.1 Irrigation Conservation and Management Programs
- 2.2.2 Irrigation Site Resource Maps
- 2.2.3 Restrict Surface and Subsurface Irrigation Water Runoff
- 2.2.4 Restrict Soil Erosion and Sediment Movement (Irrigation Sites)
- 2.2.5 Avoid Sensitive Biological Resources (Irrigation Areas, Pipelines, Pump Stations, and Electrical Support Systems)
- 2.2.6 Agrochemical and Fertilizer Best Management Practices
- 2.2.7 Prohibit Creation of Mosquito Habitat
- 2.2.8 Revegetate Temporarily Disturbed Sites
- 2.2.9 Retain Stripped Topsoil

2.2.10 Storm Water Pollution Prevention Plan
2.2.11 Protect Creeks from Toxic Discharge
2.2.12 Concrete Waste Management
2.2.13 Pipeline Features in Active Fault Zones
2.2.14 Dam Safety
2.2.15 Standard Traffic Control Procedures
2.2.16 Emergency Response Vehicles Will Not be Impeded
2.2.17 Maintain Maximum Number of Open Lanes on Roadways
2.2.18 Jack and Bore Construction at Major Highways
2.2.19 Fence or Cover Trenches
2.2.20 Access to Businesses and Residences
2.2.21 Repair Road Damage
2.2.22 Park Within Construction Easements
2.2.23 Limit Delivery Hours
2.2.24 Limit Ingress/Egress of Construction Equipment
2.2.25 Minimize/Reduce Fossil Fuel Consumption
2.2.26 Odor Control for Sludge Handling
2.2.27 Uniform Relocation Assistance

The Project also will comply with the applicable regulations of Federal, State and local agencies as identified in Section 2.1.

The components of the existing system and interim improvements which make up the No Action Alternative have been described in Section 3.2. The components which comprise Alternatives 2, 3, 4, and 5 are described below in the following order.

- Headworks Expansion
- Urban Irrigation
- Pipelines
- Storage Reservoirs
- Pump Stations
- Agricultural Irrigation
- Geysers Steamfield
- Discharge

Following the description of these components is a discussion of the Contingency Plan for excess volumes under the Project Alternatives.

Table 3.3-1

Components Utilized for Alternatives Analysis

COMPONENT	1	2A	2B	2C	2D	3A	3B	3C	3D	3E	4	5A	5B
	ALTERNATIVES												
1. NO ACTION ALTERNATIVE	■												
2. HEADWORKS EXPANSION		■	■	■	■	■	■	■	■	■	■	■	■
3. URBAN IRRIGATION													
Fountain Grove		■	■	■	■	■	■	■	■	■			
Bennett Valley		■	■	■	■	■	■	■	■	■			
4. PIPELINES		■	■	■	■	■	■	■	■	■	■	■	
5. STORAGE RESERVOIRS													
South County Reservoirs													
Tolay Extended		■											
Adobe Road			■										
Tolay Confined				■									
Lakeville Hillside			■		■								
Sears Point					■								
West County Reservoirs													
Two Rock						■							
Bloomfield							■						
Carroll Road								■					
Valley Ford									■				
Huntley										■			
6. PUMP STATIONS		■	■	■	■	■	■	■	■	■	■		
7. AGRICULTURAL IRRIGATION											1		
South County													
East of Rohnert Park		■	■	■	■								
Adobe Road		■	■	■	■								
North of Petaluma		■	■	■	■								
Lakeville		■	■	■	■								
Bay flats		■	■	■	■								
West County													
Americano						■	■	■	■	■			
Stemple						■	■	■	■	■			
Miscellaneous						■	■	■	■	■			
Sebastopol		■	■	■	■	■	■	■	■	■			
8. GEYSERS STEAMFIELD											■		
9. DISCHARGE													
Laguna - 1%		■	■	■	■	■	■	■	■	■	2	2	
Laguna - Range of discharge between 1% and 20%	■	▒	▒	▒	▒	▒	▒	▒	▒	▒			
Laguna - 20% of river flow	3												■
Russian River - 20% of river flow												■	

Notes: ▒ Component is optional ■ Component is part of Alternative

1. Existing agricultural irrigation acreage is reduced to 2,000 acres under Alternative 4 through attrition.
2. Minor discharges to the Laguna, not to exceed 1% could occur.
3. Discharge rate under the No Action Alternative would be no greater than 10%.

HEADWORKS EXPANSION (ALTERNATIVES 2, 3, 4, AND 5)

In the headworks at the Laguna Plant, raw sewage (influent) enters at two locations approximately 40 feet below grade, and after passing through bar screens, is pumped to the primary clarifiers. Six influent pumps, three on each side of the headworks, have a combined influent pumping capacity of 60 mgd peak hourly wet weather flow when one of the largest pumps is out of service for repair or maintenance. Four are 15-mgd capacity two-speed pumps, and two are 7.5-mgd capacity variable speed pumps.

Expansion of influent pumping capacity would be accomplished by replacing the existing pumps with six new 18-mgd capacity pumps, which would provide a firm capacity of 80-mgd peak hourly wet weather flow with one pump out of service to meet the required hydraulic capacity associated with the design capacity for this Project of 21 mgd ADWF. .

With expansion of the headworks, sludge production at the Laguna Plant is projected to increase as a greater volume of effluent is treated. The impacts of disposing of this projected sludge production are addressed in the Santa Rosa Subregional Sludge Beneficial Use Project Environmental Impact Report (LSA 1991).

URBAN IRRIGATION (ALTERNATIVES 2 AND 3)

Two urban irrigation projects, as shown in Figure 3.1-5, are included in this component:

- The Fountaingrove Urban Irrigation system is an extension of the existing irrigation system into the north Santa Rosa area, providing year-round irrigation of approximately 230 acres, including schools, parks, the Fountaingrove Golf Course, and other properties; and
- The Bennett Valley/East Santa Rosa Urban Irrigation system is an extension of the existing irrigation system into the east Santa Rosa area, providing year-round irrigation of 350 acres, including parks, schools, and the Bennett Valley Golf Course.

Each of the two systems would deliver reclaimed water to existing irrigated areas to replace the water source now used, primarily groundwater. The pipelines and pump stations used for the urban irrigation component are not included as part of this component, but are included under the Pipelines and Pump Stations components. More detailed information about the urban irrigation systems can be found in Technical Memorandum, *Urban Irrigation Component of the Alternative Projects* (Parsons Engineering Science, Inc. 1995f).

PIPELINES (ALTERNATIVES 2, 3, 4, AND 5)

Pipelines in the three- to four-foot diameter range would be required to transport reclaimed water from the Laguna Plant to the storage reservoirs, to the discharge point at the Russian River, or to the geysers steamfield. Generally, pipelines in the one- to three-foot diameter range would be required to distribute stored water from reservoirs to agricultural and urban irrigation areas. Some of the local distribution lines may be less than one foot in diameter.

General Pipeline Characteristics

All pipelines (except for those distributing water to the geysers injection wells within the Geysers Geothermal Reserve) would be buried and would most likely follow public rights-of-way. To reach reservoir sites some pipelines follow private roads or cross-country alignments. Acquisition of property would be required for construction of these pipelines. Parcels or easement to be acquired are listed in Appendix D-7. The City of Santa Rosa would attempt to purchase only that portion of a parcel required for construction of the pipelines. In those cases where the City would be required to purchase the entire parcel, the City would maintain the land use existing on the remainder portion at the time of acquisition, unless subsequent environmental documentation is prepared by the City. If necessary, the City would use its power of condemnation to acquire property or easements necessary to construct Project facilities.

In general, pipes would be buried with about 3 feet of cover and would be constructed in one lane or shoulder of the road, typically at 10 feet off the road centerline. However, where topographic or other physical constraints (such as proximity to buildings, fences, or vegetation) occur, the pipeline alignment may be moved closer to the centerline. With this practice, considerable repaving of roads would be required, but the pipelines would be readily accessible for maintenance.

All pipelines would have intermediate isolation valves at certain points along the pipeline. The number and spacing of these valves would vary depending upon the type of pipeline, as identified in the discussion of specific pipelines types in the following sections. At each valve location, a valve would be located in a below ground vault atop the pipe, and there would also be an air/vacuum release valve at these locations. Pipeline air/vacuum release valve stations would be located at all local high points along the pipeline alignment, and at the isolation valve stations with a vent above grade. Pipeline blowoff valve stations also would be located at all local low points, to allow periodic flushing of the pipeline to remove accumulated solids, with a drain outlet above grade.

The pipelines would cross numerous perennial or intermittent streams. As identified in Section 2.2, bore and jack crossings which avoid construction within the waterway would be utilized at 33 locations. At these locations, the waterways have surface flow throughout the year or maintain substantial pools of water at the crossing (with riparian woodland and freshwater or brackish marsh) and have sufficient water quality to maintain aquatic life for most of the year.

Bore and jack crossings would also be used where the pipelines cross rail lines, major highways (such as Highways 101 and 12), and other major underground facilities (such as the Sonoma County Water Agency aqueduct).

Three stream crossings on the pipeline serving the Bennett Valley urban irrigation system would have pipelines suspended from existing bridges, these are:

- Santa Rosa Creek - Madison Street
- Santa Rosa Creek - 3rd Street
- Santa Rosa Creek - Olive Street

Rupture of a transmission or distribution pipeline would result in the release of reclaimed water. The amount of water that would leak from a pipe break depends on the size of the break, the pressure of the line at the break, the opportunity to isolate the section of pipeline with the break, and the length of time the leak continues.

The length of time a leak may continue would relate to the time the break went undetected and the time it would take to close an isolation valve. Because nearly all pipelines are along public rights-of-way, it is expected that a major pipeline break would show itself and be detected within several hours of the break. Smaller leaks could go undetected or be confused with natural drainage flows. In either case, several tens of thousands of gallons of reclaimed water could leak from such a pipeline break before detection and repair. Visual inspection for detection of pipeline breaks is proposed as the most practical and reliable method. Once detected, the closest isolation valve on either side of the break could be located and closed in about one hour.

The major conditions which could lead to pipeline breaks include seismic activity, landslides, and unusual pressure spikes due to improper system operation. Pressure spikes due to improper operation would be protected against by designing the pipeline to accommodate these spikes. This would include extra pipeline wall thickness and inclusion of pressure surge equipment and controls at the pump stations (where pressure spikes are usually initiated).

The Project area, as a whole, does not have a high seismic threat. The only proposed pipelines which would cross known fault zones are the urban irrigation mainlines (12" size to the Fountaingrove area and 18" size to the Bennett Valley area) and the geysers pipeline at two locations (one 42" size and one 48" size). Potential landslides are a threat for the Bennett Valley urban irrigation pipeline and for the geysers pipeline along Pine Flat Road (42" size). To illustrate the relative magnitude of such events, the maximum volume of water released from a rupture of the geysers pipeline would be 1.7 million gallons; this would be from a rupture at the Maacamas Fault, located just above Pump Station G-2. Rupture of an urban irrigation pipeline (12" diameter) along the Rodgers Creek Fault would result in the release of up to 100,000 gallons of water.

Transmission Pipelines (Alternatives 2 and 3 - All Subalternatives)

Transmission pipelines are required to transport reclaimed water from the new pump station at the Laguna Plant to the reservoir sites for storage, as shown in Figures 3.1-5 and 3.1-6. Alignments primarily follow public rights-of-way, except for short cross-country sections to enter the reservoirs. These pipelines are typically 48 inches in diameter. Pipelines would be welded steel pipe construction, cement mortar lined and coated, with welded joints and intermediate isolation valves (normally open) located at 2,500-foot intervals. Additional information on the proposed transport pipelines is contained in *Transmission Pipeline Routes to All Reservoir Sites* (Parsons Engineering Science, Inc. 1995e).

Irrigation Distribution Pipelines (Alternatives 2 and 3 - All Subalternatives)

The irrigation distribution pipeline system includes those pipelines which convey the stored reclaimed water from the irrigation pump station, located at the storage reservoir, to agricultural irrigation areas, as shown in Figures 3.1-5 and 3.1-6. (Some transmission pipelines may also function as distribution pipelines during the irrigation season). Distribution pipelines are also proposed for the Fountaingrove and Bennett Valley urban irrigation systems, conveying reclaimed water from a pump station at the West College Ponds to the various urban irrigation sites. No new pipelines within the urban irrigation sites would be constructed as part of the Project. The pipeline widths for the distribution system, typically 12 to 36 inches, are smaller than for the transport pipelines. Pipelines 24 inches in diameter and larger would be welded steel pipe construction, cement mortar lined and coated with welded joints; pipelines smaller than 24 inches in diameter would be ductile iron, polyethylene encased. Intermediate isolation valves (normally open) would be located at major pipe junctions and at 1,500-foot intervals. Alignment of the distribution pipelines would follow public rights-of-way. Pipelines within the agricultural irrigation areas are addressed under the agricultural irrigation component.

Pipeline Tunnel (Subalternatives 2C, 2D, and 3A)

Tunnels are proposed to carry transmission pipelines through the ridge west of Tolay Valley to enter Tolay Confined reservoir (Subalternative 2C) or Sears Point reservoir (Subalternative 2D); and to carry the transport pipeline through the ridge north of Two Rock reservoir (Subalternative 3A), as shown in Figures 3.1-5 and 3.1-6. These tunnels would have a diameter of 10 feet and a length of 1,800 feet for the tunnel entering Tolay Confined or Sears Point reservoirs and 2,400 feet for the tunnel entering the Two Rock reservoir. The pipeline invert elevation at the bottom of the pipe through the tunnel would be 270 feet for the Tolay Confined or Sears Point reservoirs and 390 feet for the Two Rock reservoir. There would be concrete portal structures on either end of the tunnel, and the tunnel itself would be backfilled and the portals sealed. Additional information on the proposed tunnels is contained in *Transmission Pipelines to Storage Tunnel Length Optimization Analysis* (Parsons Engineering Science, Inc. 1995d).

Geysers Pipeline (Alternative 4)

Pipelines are required to transport reclaimed water from Delta Pond to the geysers steamfield, as shown in Figure 3.1-7. The pipeline alignment follows public rights-of-way, including Pine Flat Road, except for cross-country sections at the top of Pine Flat Road to the two storage/distribution tanks and from the storage tanks to the steamfield area. The pipeline varies from 42 to 48 inches in diameter. Along Pine Flat Road, the alignment would be along the up-slope lane where possible. Substantial grading would be required in local areas to provide a sufficient construction easement and/or to stabilize the slope prior to installing the pipeline. In locations where the cliff is rocky and steep, construction would stay in the roadbed, with construction staged from downslope areas.

Pipelines would be welded steel pipe construction, cement mortar lined and coated with welded joints. Isolation valves would be located every five miles between Delta Pond and the foot of Pine Flat Road, and every 1.25 miles beyond that location, to allow isolation and draining of the pipeline in the event of rupture. Additional information on the geysers transport pipeline is contained in *Geysers Recharge Water Balance and Operation Considerations* (Parsons Engineering Science, Inc. 1995b). Pipelines within the geysers steamfield are addressed under the geysers steamfield component.

Russian River Discharge Pipeline (Subalternative 5A)

The proposed routing of the direct discharge pipeline to the Russian River would utilize an existing 27-inch pipeline and construct new 48- and 54-inch pipelines. The new 48-inch pipeline would exit the Delta pump station and run parallel to the existing 27-inch line, with the flow split between these two pipes. Prior to entry to the North Booster pump station, the two pipes merge into a 54-inch line which leads to the river discharge location.

The alignment follows public rights-of-way or city easements except for a short cross country section to the outfall structure. Pipelines would be welded steel pipe construction, cement mortar lined and coated with welded joints. Isolation valves would be located every 5,000 feet to allow isolation and draining of short sections for repair in the event of rupture.

STORAGE RESERVOIRS (ALTERNATIVES 2 AND 3 - ALL SUBALTERNATIVES)

Ten sites for storage reservoirs are included in the Project, five each in South County and West County (see Figures 3.3-1 through 3.3-10). No new storage in the Laguna de Santa Rosa watershed is proposed. Each individual reservoir site could satisfy the maximum storage requirement for the Project, except for the Sears Point, Adobe Road, and Lakeville Hillside reservoirs. Combinations of two of these three reservoirs are necessary

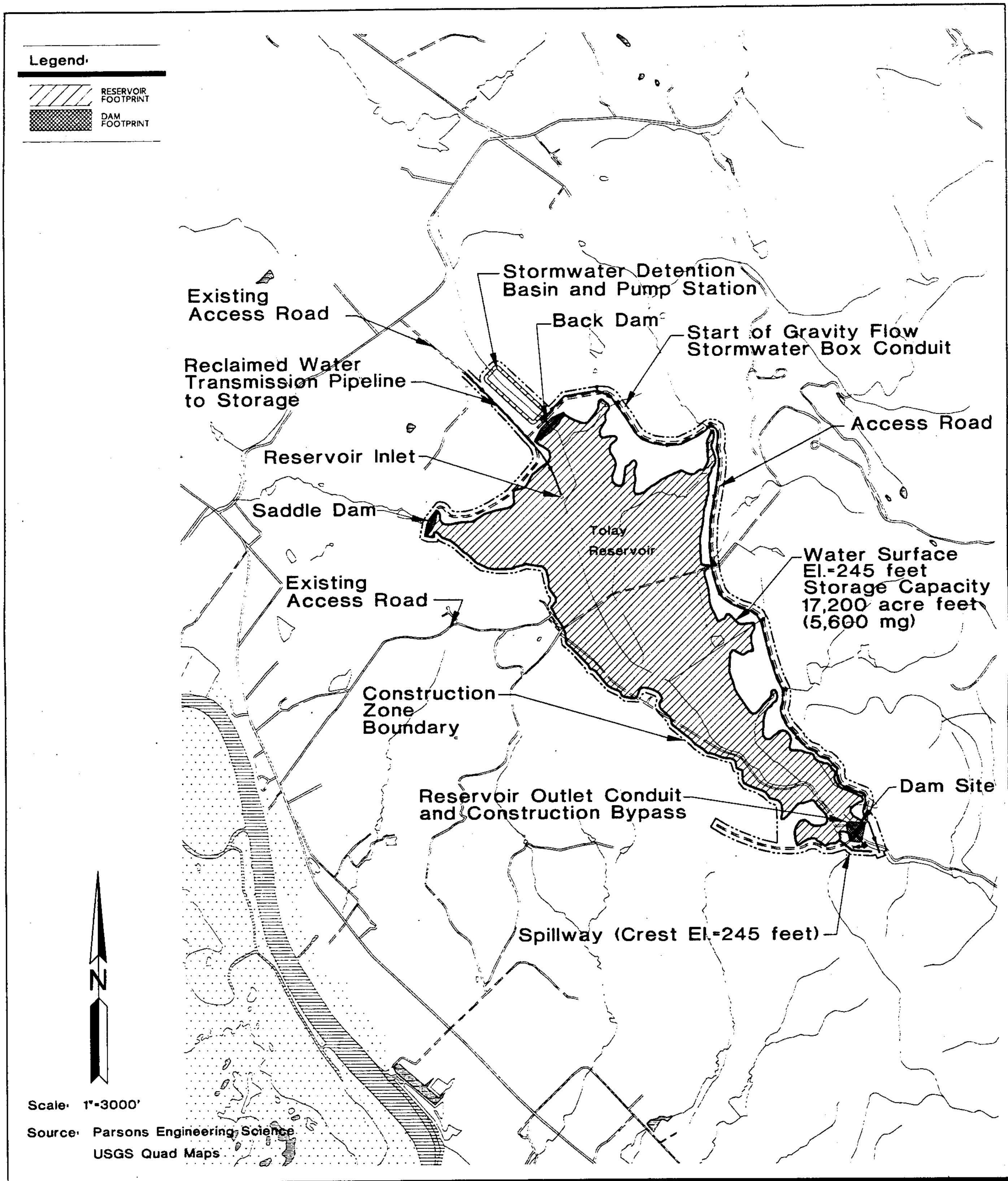

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Figure 3.3-1

TOLAY EXTENDED RESERVOIR

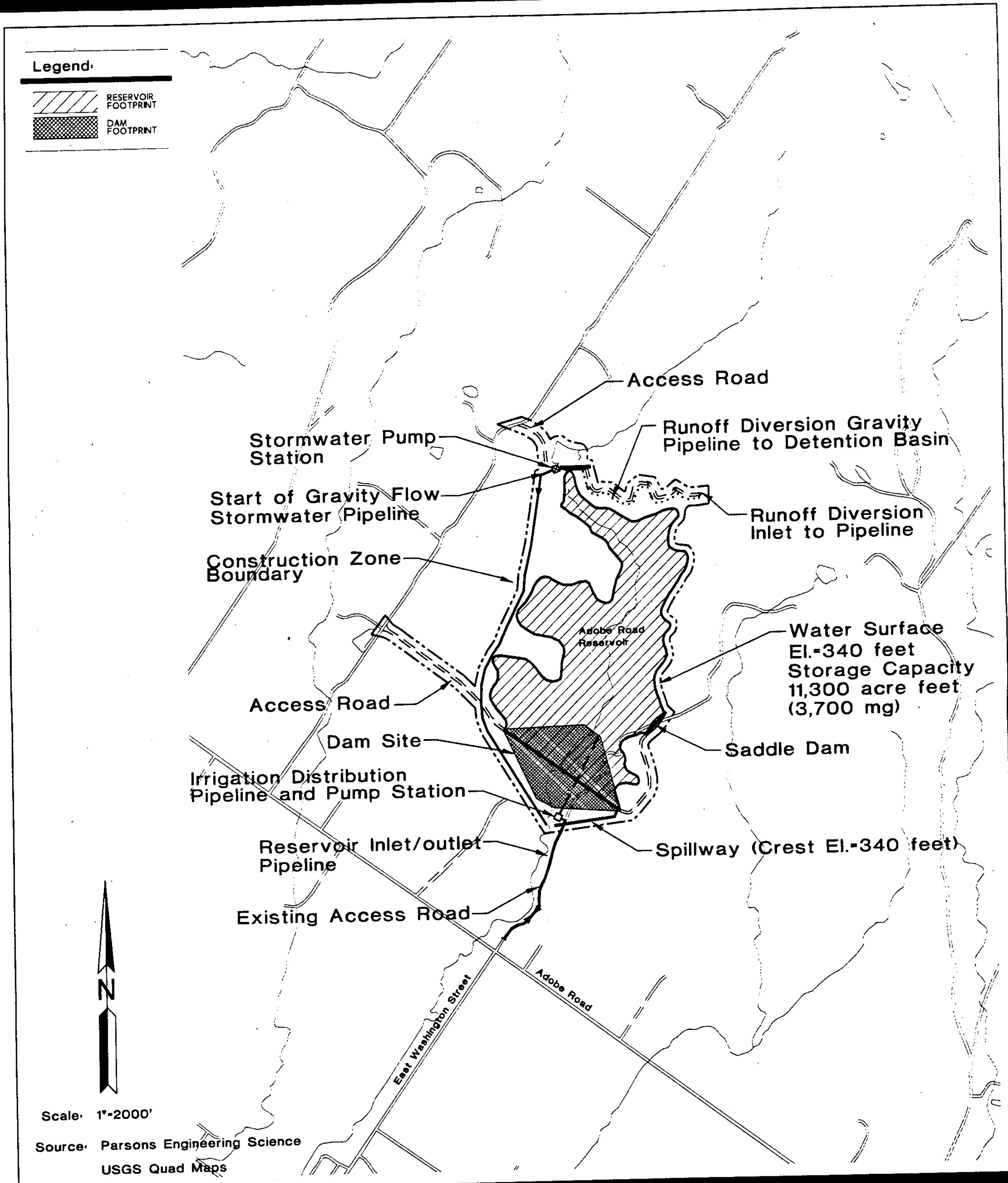

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Figure 3.3-2

ADOBE ROAD RESERVOIR

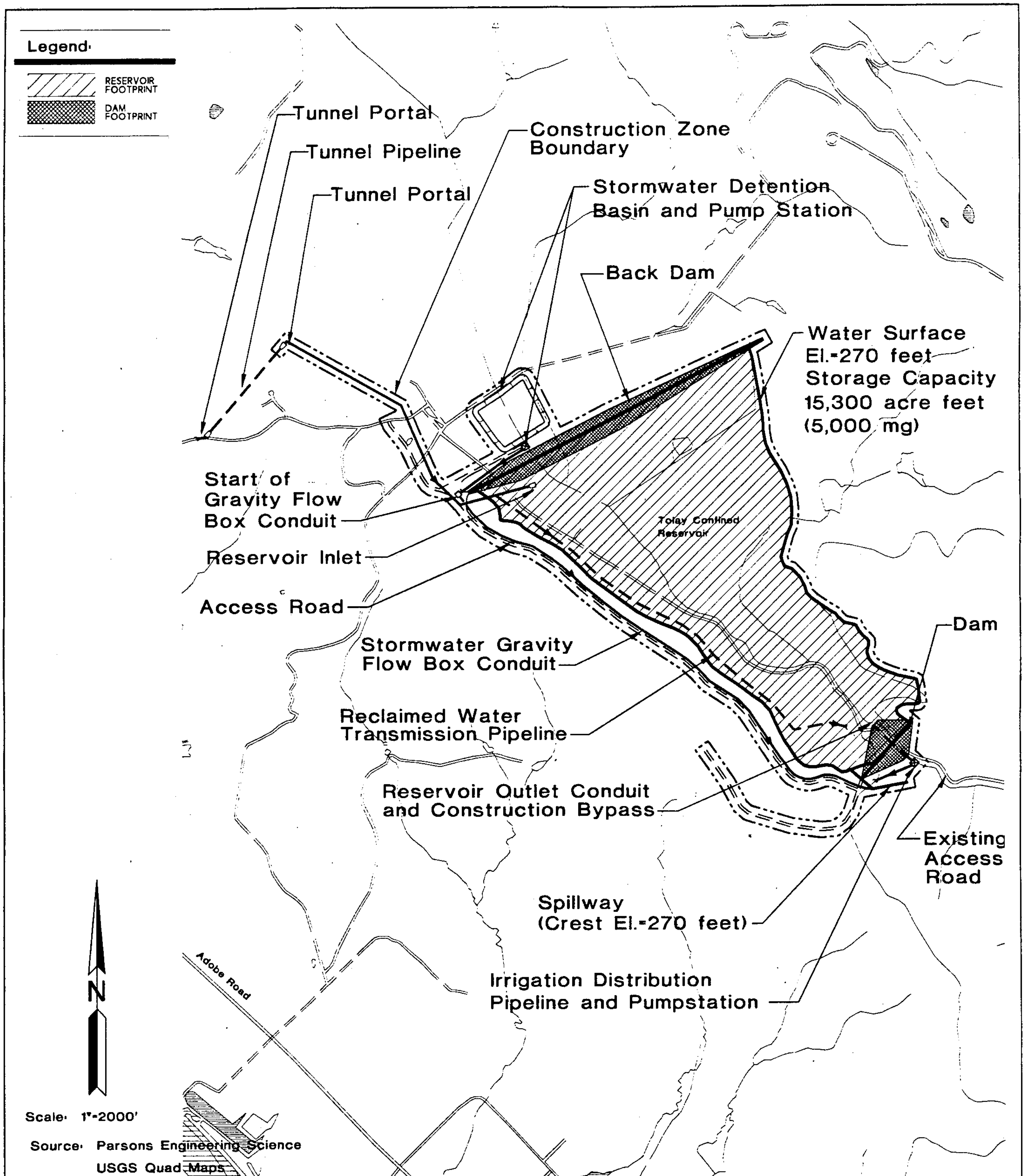

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Figure 3.3-3

TOLAY CONFINED RESERVOIR

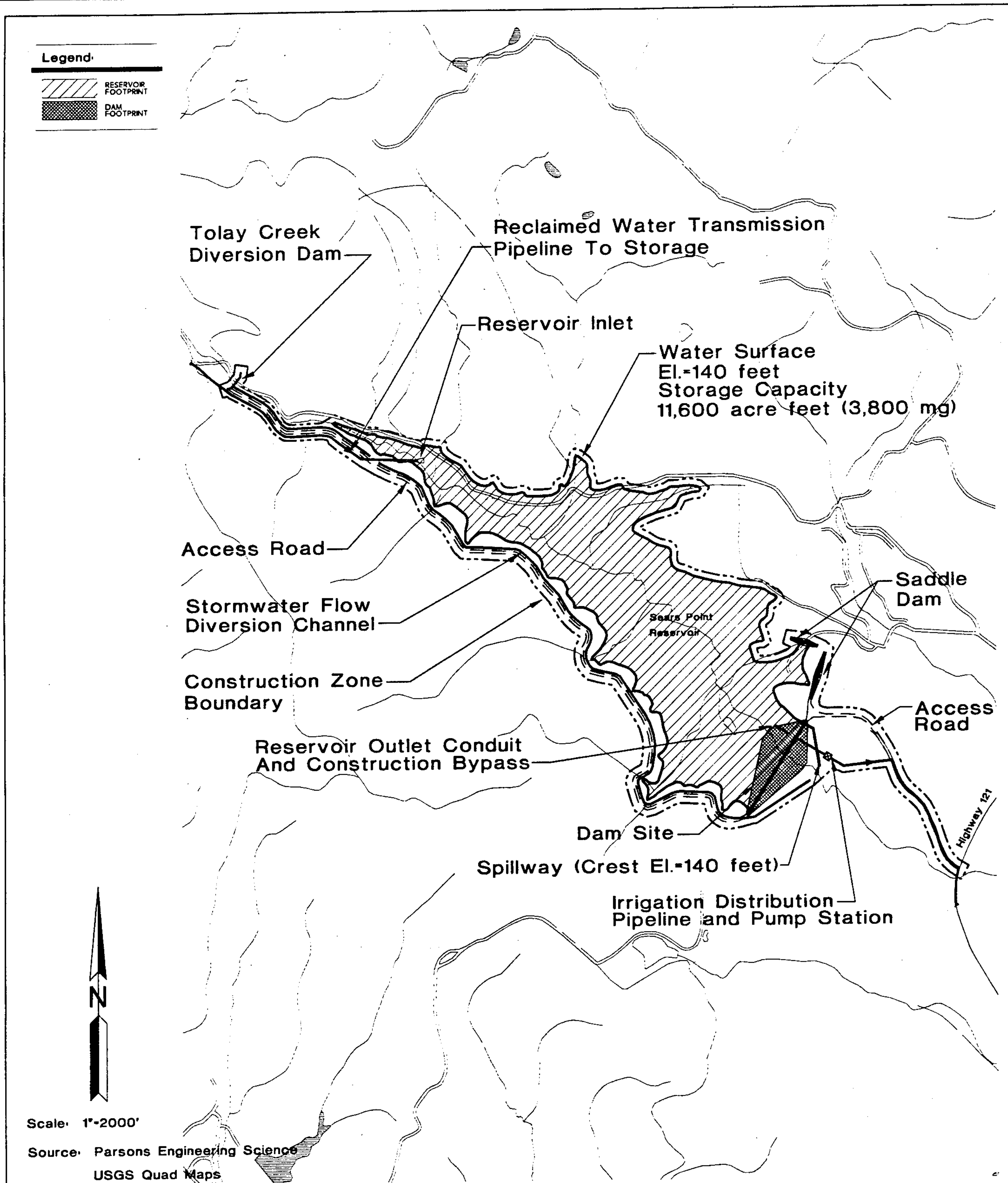

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Figure 3.3-4

SEARS POINT RESERVOIR

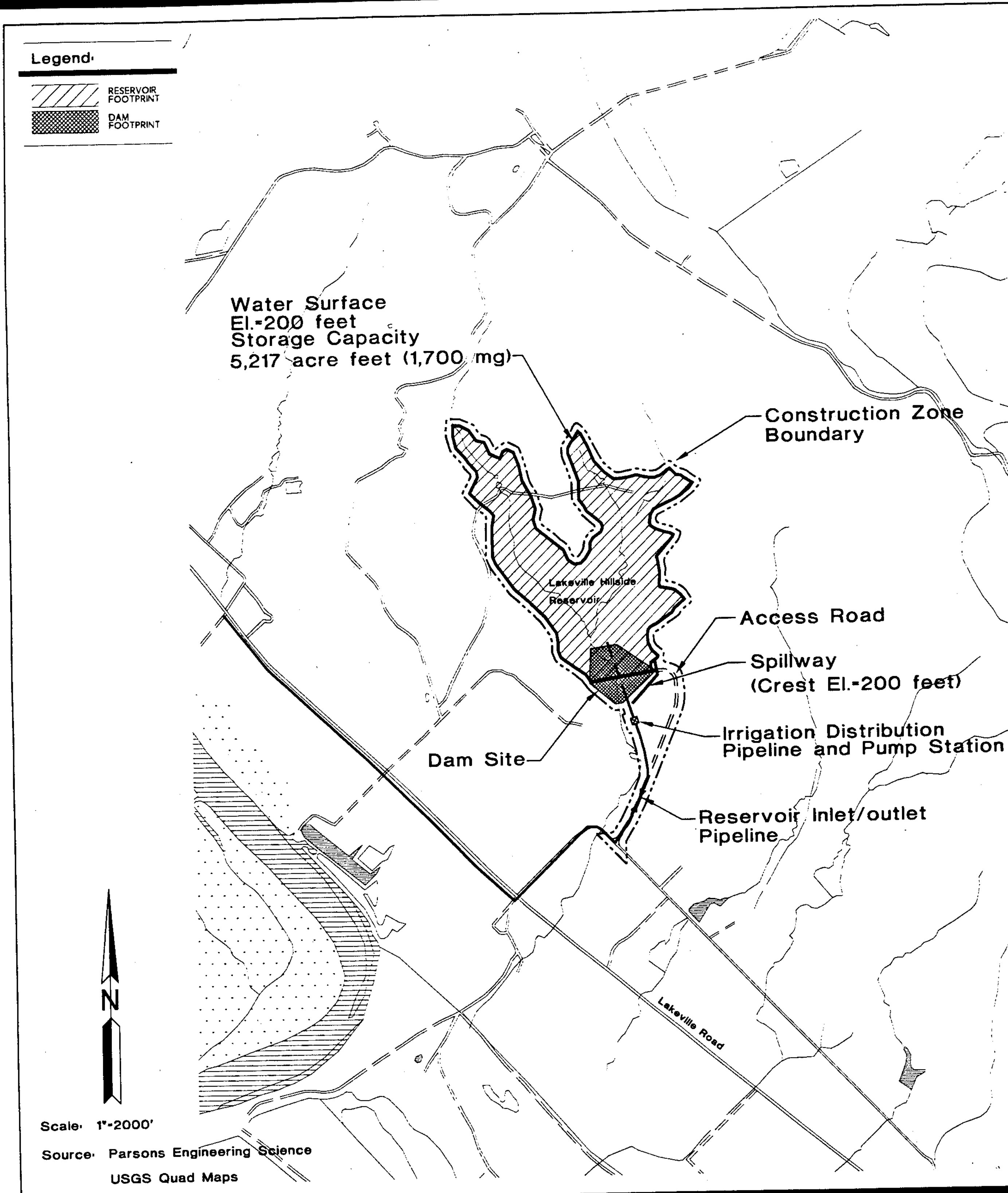

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Figure 3.3-5
LAKEVILLE
HILLSIDE RESERVOIR

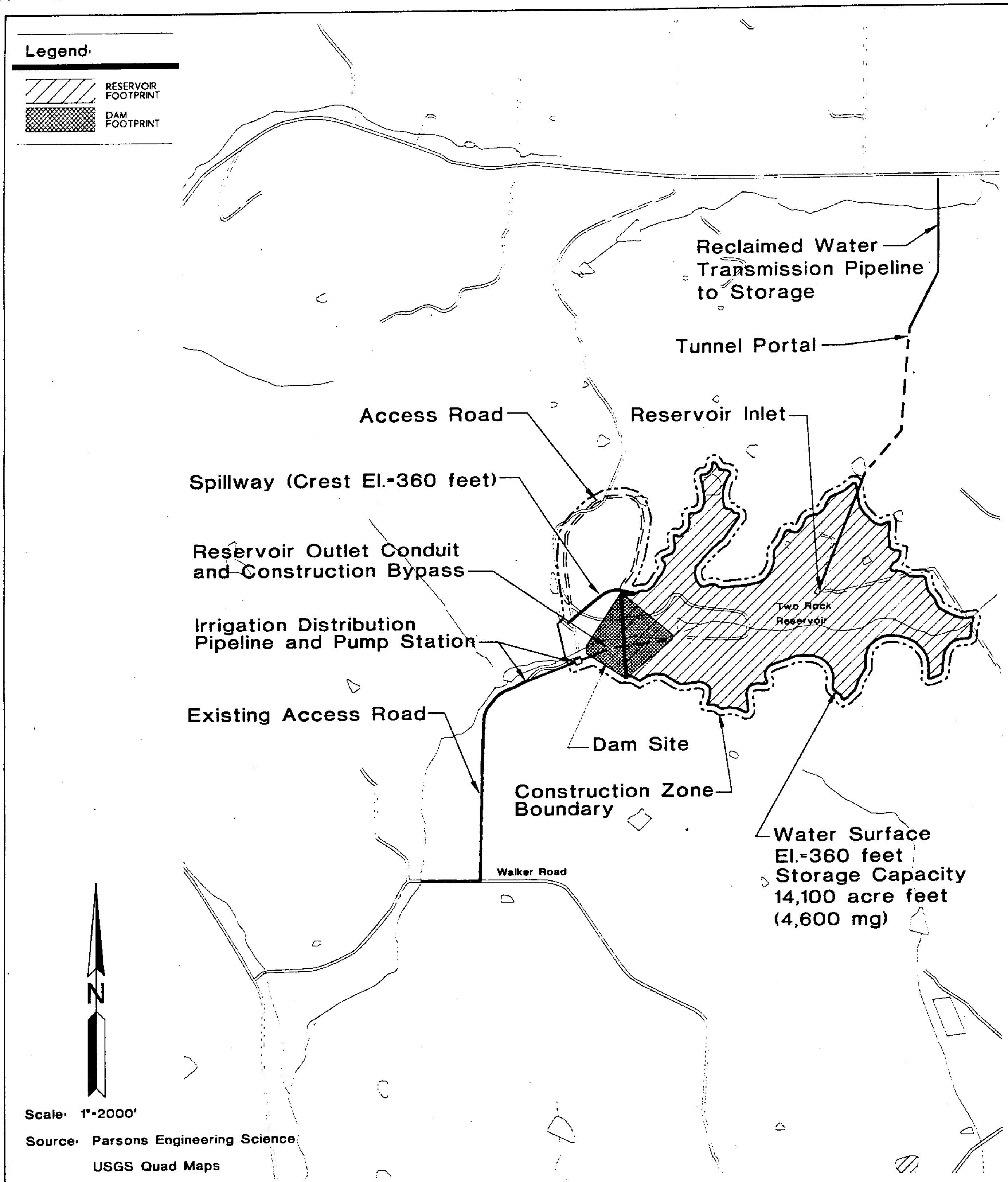

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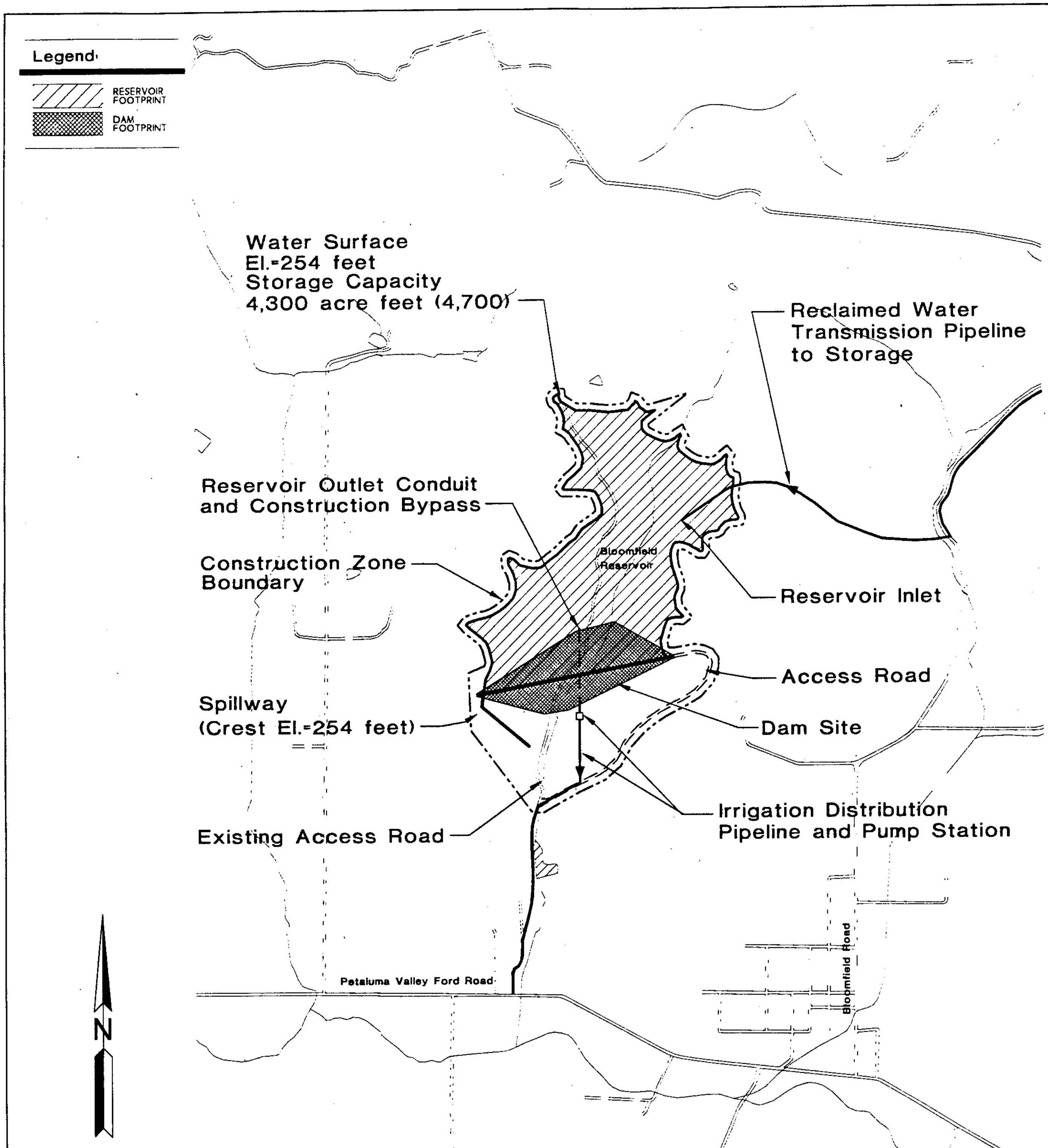
Figure 3.3-6
TWO ROCK RESERVOIR



Scale: 1"=2000'

Source: Parsons Engineering Science
USGS Quad Maps

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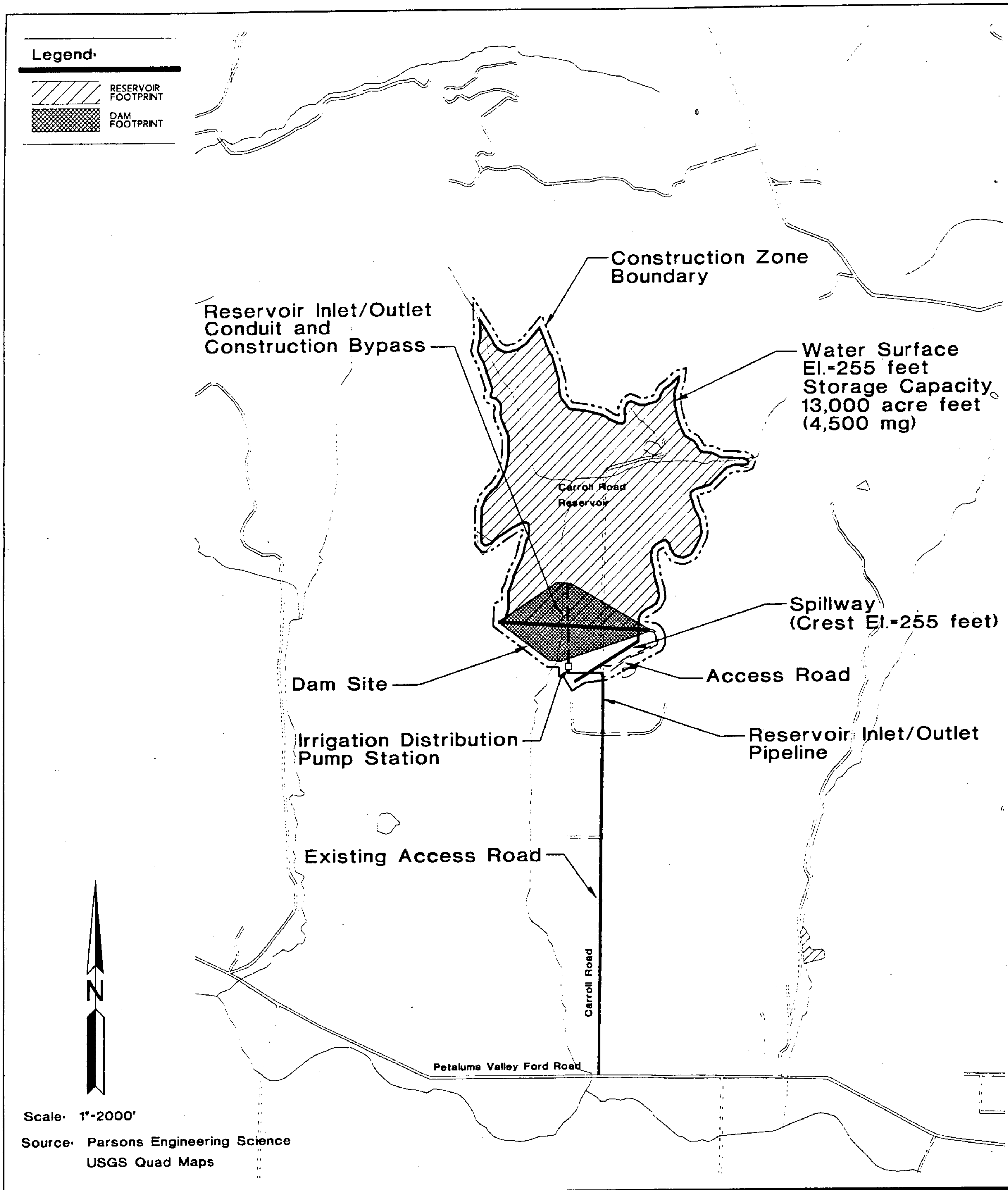
Figure 3.3-7

BLOOMFIELD RESERVOIR



Scale: 1"=2000'

Source: Parsons Engineering Science USGS Quad Maps

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Figure 3.3-8

CARROLL ROAD RESERVOIR

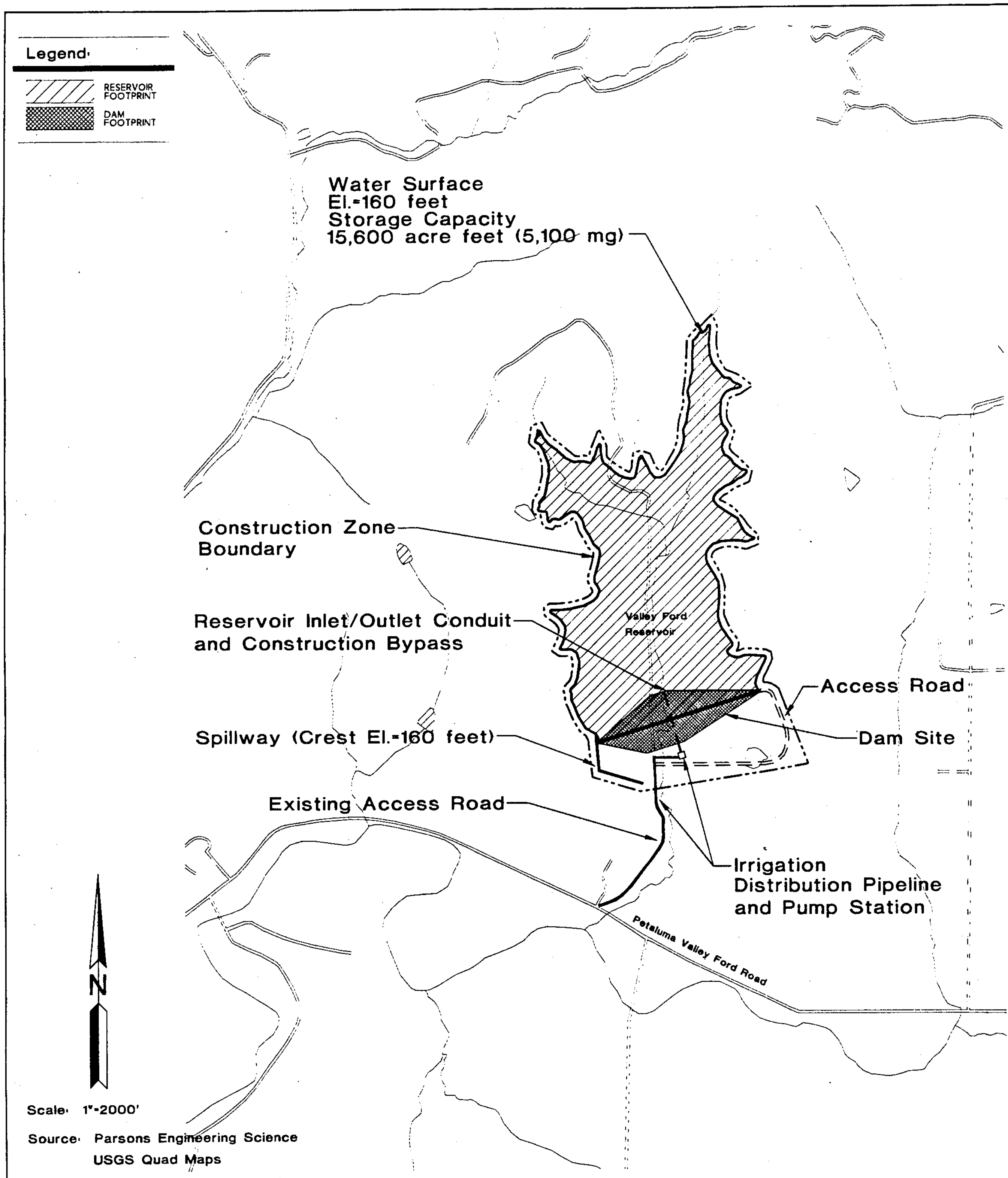

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Figure 3.3-9

VALLEY FORD RESERVOIR

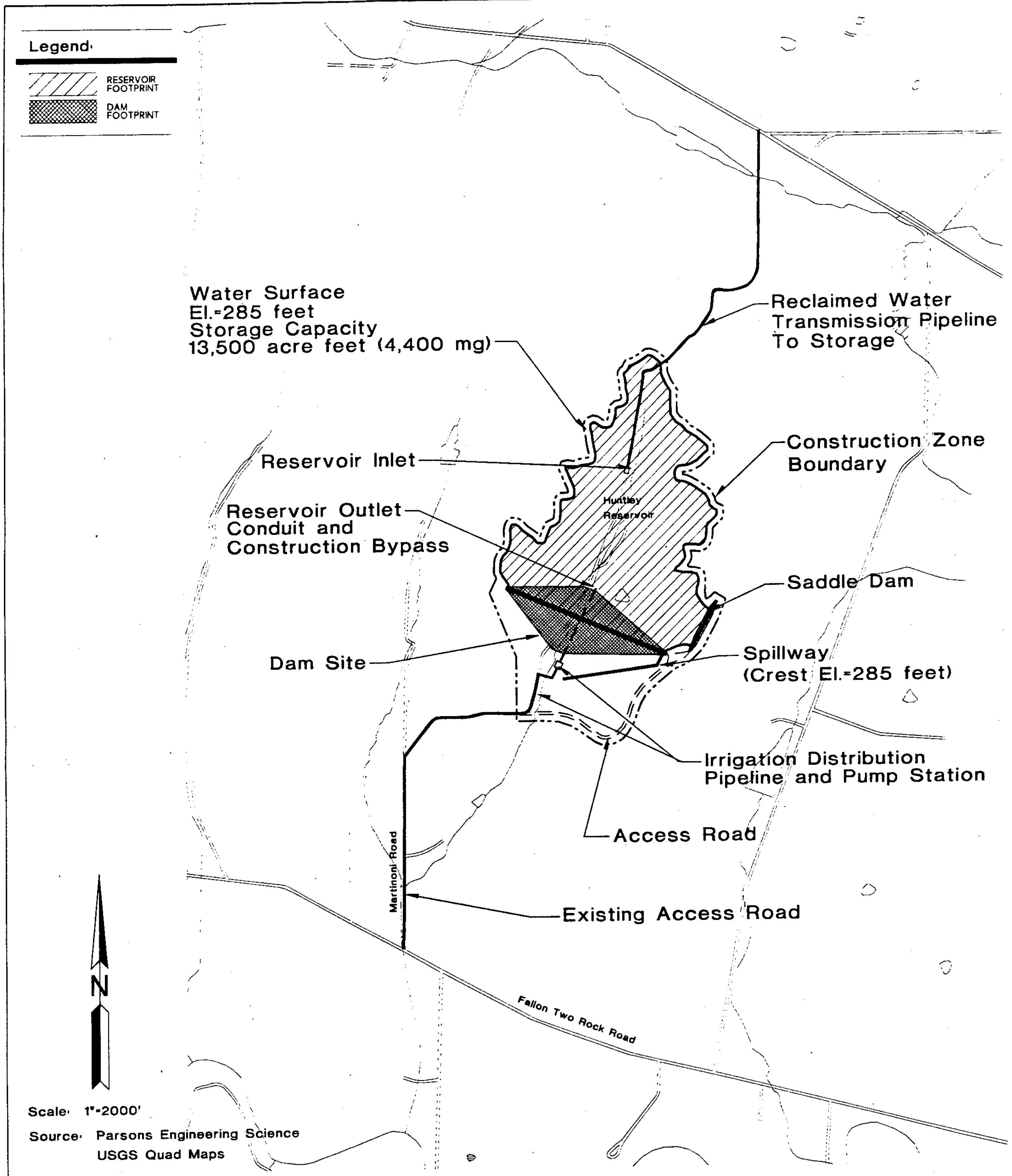

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Figure 3.3-10

HUNTLEY RESERVOIR

for Subalternatives 2B and 2D to meet the maximum expected storage requirement. Two configurations of Tolay reservoirs are presented. The Tolay Confined configuration is smaller than the Tolay Extended configuration because of a large backdam across the middle of the valley.

General Reservoir Characteristics

All reservoirs would be constructed by damming a natural drainage or valley by means of an earth filled embankment dam. In addition to the main dam, some of the reservoirs would include a smaller back dam which would isolate a portion of the drainage area from the reservoir. This would be done to prevent flooding of a portion of the drainage area so that the current land use could be maintained. In addition, some of the reservoirs would include one or more saddle dams which would prevent the full reservoir from spilling out into an adjacent watershed. The purpose of the saddle dams is to maximize storage capacity at the reservoir site while limiting impact on adjacent property.

Portions of the Adobe Road, Lakeville Hillside, Two Rock, and Huntley reservoirs would require a 3-inch thick clay lining to reduce reservoir leakage into pervious soils which occur in portions of these sites.

Acquisition of property would be required for the reservoirs and appurtenant facilities, including inlet and outlet pipelines and access roads. The anticipated construction zones for the reservoirs are shown on Figures 3.3-1 through 3.3-10. Parcels which are located within these construction zones are listed in Appendix D-7. The City of Santa Rosa would attempt to purchase only that portion of a parcel necessary for the actual construction of the Project coincident with the designated construction zone. In those cases where the City would be required to purchase the entire parcel, the City would maintain the land use existing on the remainder portion at the time of acquisition, unless subsequent environmental documentation is prepared by the City If necessary, the City would use its powers of condemnation to acquire property necessary to construct Project facilities.

Additional information about the storage reservoirs is contained in *Reservoir Stormwater Runoff Diversion Structures* Technical Memorandum (Parsons Engineering Science, Inc. 1995c).

Main Dam (Alternatives 2 and 3 - All Subalternatives)

All reservoirs will have an earthen embankment main dam, with a clay core and rock facing for slope protection (see Figures 3.3-1 through 3.3-10). Characteristics of these dams, including height and volume, are provided in Table 3.3-2. There are borrow areas, which provide the basic fill material for construction of the dam, located within the reservoir envelope. However, all reservoirs would require some volume of imported specialized materials including gravel for filter zone adjacent to the core (which controls water seepage) and rock for embankment slope protection.

Back Dam (Subalternatives 2A and 2C)

Tolay Extended and Tolay Confined reservoirs would require a back dam upstream of the main dam to prevent flooding of a portion of the watershed. As shown in Figures 3.3-1 and 3.3-3, back dams would include vehicular access to the top of the dam and a storm water pump station to remove runoff collecting behind the dam. Characteristics of these back dams, including height, length and volume, are provided in Table 3.3-3.

Saddle Dam (Subalternatives 2A, 2B, 2D, and 3E)

Tolay Extended, Adobe Road, Sears Point, and Huntley reservoirs would require saddle dams to prevent spilling of water out of the reservoir into an adjacent watershed (see Figures 3.3-1, 3.3-2, 3.3-5 and 3.3-10). These dams are located at high points around the reservoir watershed. A spillway, outlet works, and pump station would not be required for these dams; however, vehicular access to the top of saddle dams would be required. Characteristics of these dams, including height, length, and volume, are provided in Table 3.3-3.

Spillway (Alternatives 2 and 3 - All Subalternatives)

For all main dams, a concrete-lined, chute-type spillway would be constructed, as shown in Figures 3.3-1 through 3.3-10. The spillway would extend from the embankment downslope to discharge through an energy dissipation structure into a channel below the dam. The energy dissipation structure would consist of a rock lining for the natural creek channel up to 25 feet wide for up to 300 feet downstream from the spillway. The spillway is intended to provide for emergency release of water only in the event of upstream flow from a severe storm entering the reservoir when it is full. The capacity of the spillway would be designed to pass the probable maximum flood from such a storm event in accordance with requirements of the State Department of Water Resources, Division of Safety of Dams.

Reservoir Inlet and Outlet (Alternatives 2 and 3 - All Subalternatives)

For Tolay Extended, Tolay Confined, Sears Point, Two Rock, Bloomfield, and Huntley reservoirs, the inlet pipeline would enter the reservoir watershed from over a ridge. For the other reservoirs, the outlet conduit through the dam embankment would also serve as the inlet pipeline. The outlet conduit would have two outlets: a discharge into the natural creek channel for emergency use only and a pipeline leading to the irrigation pump station at the base of the dam. The conduit would be sized to allow emergency drawdown of the reservoir level at a rate of half the reservoir capacity in seven days in accordance with requirements of the Division of Safety of Dams.

Table 3.3-2

Storage Reservoir Characteristics (With Stormwater Runoff Diversion)

Reservoir	Water Surface Area (acres)	Gross Capacity (MG) [1]	Total Storage (Acre-Ft)	Dam Height (Feet) [2]	Spillway Crest Elevation (Feet)	Watershed Area (Acres) [3]	Captured Runoff Volume (MG) [4,5]	Dead Storage (MG) [6]	Net Reclaimed Water Storage (MG) [4]
Tolay Extended	800	5,600	17,200	90	245	3,400	85	750	4,000
Adobe Road	170	3700	11,300	205	340	1,050	10	200	3,400
Tolay Confined	390	5,000	15,300	115	270	1,300	600	400	4,000
Lakeville	155	1500	4,600	135	200	500	30	200	1,000
Sears Point	270	3800	11,600	115	140	6,080	60	200	3,000
Two Rock	230	4,600	14,100	225	360	700	40	200	4,000
Bloomfield	195	4,500	13,800	190	255	600	40	100	4,000
Carroll Road	235	4,700	14,400	195	255	850	60	100	4,000
Valley Ford	260	5,100	15,600	140	160	880	60	500	4,000
Huntley	175	4,400	13,500	210	285	360	30	100	4,000

Source: Parsons Engineering Science, Inc., September 1995

Notes:
1 Gross Capacity (w/ runoff diversion) = Dead Storage + Captured Runoff Volume + Net Reclaimed Water Storage
2 Measured from creek channel at downstream toe of dam.
3 Includes water surface area; excludes watershed area upstream of backdams for Tolay Extended and Confined reservoirs.
4 Assumes runoff captured upstream of Tolay Extended and Confined backdams is diverted around reservoir; therefore, this volume not included.
5 Estimated as 50% of 10 year return period annual precipitation to account for losses by percolation and evaporation.
6 Active water level at approx. 20 ft above reservoir floor.

Table 3.3-3

Reservoir Back Dams and Saddle Dams

Reservoir	Backdam	Saddle Dam	Height (Feet)	Length (Feet)
Tolay Extended	BD-A		53	1,000
		R1	20	700
Tolay Confined	BD-C		80	5,300
Sears Point		L1	20	800
		L2	20	450
Adobe Road		L1	20	500
		R1	20	500
		R2	20	800
Huntley		L1	20	900

Source: Parsons Engineering Science, October 1995

Access Road and Fencing (Alternatives 2 and 3 - All Subalternatives)

An access road would be provided at each reservoir site for dam construction and maintenance, as shown in Figures 3.3-1 through 3.3-10. The road would run to the outlet works and irrigation pump station at the base of dam; to the top of main, back and saddle dams; and to the storm water runoff pump station at the base of backdams. An access road would not be required around the entire perimeter of the reservoir. The roads would have a 12-foot wide roadbed, with 3-foot graded shoulders. The roads would have a gravel surface for grades up to 5%, with asphalt pavement for grades over 5% (for all weather access). Cattle fencing would be installed around the entire reservoir site.

Runoff Diversion Structures (Subalternatives 2A, 2B, 2C, and 2D)

Runoff diversion structures are needed for Tolay Extended, Adobe Road, Tolay Confined, and Sears Point reservoirs, as shown in Figures 3.3-1, 3.3-2, 3.3-3 and 3.3-5. The purpose of these structures is to limit consumption of storage volume by watershed runoff and/or to remove runoff collecting behind back dams. Specific facilities proposed for runoff diversion at each of the four reservoirs are described below.

Tolay Extended Reservoir (Subalternatives 2A)

- A stormwater detention basin, upstream of the reservoir back dam, to capture Tolay Creek flow upstream of the reservoir, excavated 10 feet deep over about 6 acres;

- A storm water pump station (TASW) at the detention basin with two 25,000-gpm pumps;

- A 48-inch pressurized pipeline from the pump station, discharging into the gravity flow box conduit; and

- A gravity flow, cast-in-place reinforced concrete box conduit, 15,300 feet long, along the east side of reservoir. The size of the conduit would range from 8' x 9' at the northern end to 10' x 12' at the southern end. It is located above the waterline and extends from near the reservoir backdam to Tolay main dam, discharging into Tolay Creek. The conduit also collects runoff from drainage gullies along the east side of the reservoir.

Adobe Road Reservoir (Subalternative 2B)

- A storm water detention basin and dam in area of existing stock pond to capture creek flow upstream of the reservoir;

- A runoff collection gravity pipeline, above the northeast end of reservoir, discharging into the detention basin;

- A storm water pump station (ARSW) at the detention basin, with two 28,400-gpm pumps;

- A 48-inch pressurized pipeline from the pump station, which lifts flow up 150 feet to discharge into gravity pipeline; and

- A 60-inch reinforced concrete gravity-flow pipeline, 5,800 feet long, along the west side of the reservoir from the pump station to below the main dam, discharging into Adobe Creek.

Tolay Confined Reservoir (Subalternative 2C)

- A storm water detention basin, upstream of the reservoir back dam, to capture Tolay Creek flow upstream of the reservoir, excavated 18 feet deep over about 7 acres;

- A storm water pump station (TASW) at the detention basin with five 46,500-gpm pumps;

- A pressurized pipeline, 900 feet long, from the pump station to the gravity flow box conduit; and

- A gravity flow, reinforced concrete box conduit, 9,500 feet long, along west side of reservoir from back dam to the main dam, discharging into Tolay Creek. The conduit would be 7' x 8' in size.

Sears Point Reservoir (Subalternative 2D)

- A 30-foot high storm water diversion dam, located upstream of the reservoir at the Tolay dam site, to capture Tolay Creek flow upstream of the reservoir; and

- A gravity flow rectangular concrete open channel, 25 feet wide, 15 feet deep, and 12,650 feet long, along west side of reservoir, from the diversion dam to Sears Point dam, discharging into Tolay Creek downstream of dam.

Reservoir Storage Volumes and the Water Balance

Reclaimed water generated by the Laguna Plant must be stored, used for irrigation, or discharged in a reliable manner. The water balance between supply, storage, irrigation needs, and river discharge was determined by a computer model constructed for this purpose.

Monthly operation of the reclamation system is based primarily upon the allocation priorities of the water balance model, which allocates reclaimed water to storage, irrigation, and river discharge based on priorities programmed into equations. The first priority is irrigation, and the model attempts to fulfill irrigation requirements using reclaimed water flows and storage. After irrigation, storage is the next priority, and the model attempts to achieve target storage, a predetermined storage level for each month, collectively referred to as the target storage curve. After irrigation and storage requirements are considered, any reclaimed water that remains for disposal is discharged to the Russian River.

On a monthly or seasonal basis the reclamation system should be operated as follows:

- October. The irrigation season is ending and irrigation requirements are small. The storage system is empty and begins to fill according to target storage curve. Discharge season begins but river flows and discharge volumes are relatively low.

- November through March. Essentially, there is no irrigation (except for winter irrigation, strictly as part of the contingency plan discussed at the end of this section). Reclaimed water is stored according to target storage guidelines. The remainder of the reclaimed water is discharged to the Russian River, within the design limits. Any reclaimed water in excess of that to be stored or discharged falls into the contingency volume category. Contingency volumes are disposed of through winter irrigation, emergency water conservation, contingency storage, or contingency discharge.

- April and May. River flows and discharges gradually decline as the irrigation season begins. Storage volume approaches maximum capacity.
- June through September. Irrigation season is fully underway, and there is no river discharge. Storage declines as the stored water is used to meet the peak irrigation requirements.

Actual operations may vary slightly from the water balance model allocation priorities. The model places a higher priority on achieving target storage than on discharging to the river. Actual operations may be modified so that these priorities are reversed in the early discharge season (October-December). Utilizing river discharge potential at the expense of target storage early in the discharge season would increase available storage capacity and reduce the incidence of contingency events later in the discharge season.

The Technical Memorandum, *Water Balance Model Summary and Results* (Parsons Engineering Science, Inc. 1995h), describes the water balance model in greater detail.

PUMP STATIONS (ALTERNATIVES 2, 3, AND 4)

New pump stations would be required as part of the Project for Alternatives 2, 3, and 4. The capacity and features of these stations are listed in Table 3.3-4.

General Characteristics

Pump stations at the Meadowlane Ponds, Delta Pond, and West College Ponds, as well as the storm water pump stations at the Adobe Road, Tolay Extended, and Tolay Confined reservoirs would have vertical turbine pumps located outside. All other pump stations, as described in Table 3.3-4, would have centrifugal pumps located aboveground within enclosed structures ranging in size from 100 to 1,200 square feet. These buildings would be masonry construction, single story, with peaked metal roofing panels. The buildings would house pump control panels, instrumentation, and pumps and would include noise attenuation insulation and features. There would be two to five pumps at each pump station, and the pump motors would range between 5 and 1,000 horsepower each, depending upon the required pumping capacity for each station.

Acquisition of property would be required for construction of 27 of the proposed pump stations. The remaining pump stations would be constructed on City owned sites or sites to be acquired for reservoirs. The anticipated area of the site to be acquired for each pump station would not exceed one acre. Parcels which contain a pump station site to be acquired are listed in Appendix D-7. The City of Santa Rosa would attempt to purchase only that portion of a parcel required. In those cases where the City would be required to purchase the entire parcel, the City would maintain the land use existing on the remainder portion at the time of acquisition, unless subsequent environmental documentation is

Table 3.3-4

Pump Stations Characteristics

Pump Station	Alternative or Subalternative	Location	Number of Pumps[1]	Pump Capacity (gpm, each)	Motor HP (each pump)	Pump Type[2]	Building Size [3]
S	2, 3	Meadowlane Ponds	4	6,000	750	VT	20' X 60'
TASW	2A	Tolay A Stormwater	3, Inside	25,000	400	VT	20' X 60'
TCSW	2C	Tolay C Stormwater	3, Inside	46,000	1000	VT	20' X 60'
ARSW	2B	Adobe Road Stormwater	3, Inside	28,400	550	VT	20' X 60'
T	2A	Tolay Dam	5, Inside	5,600	750	CENT	20' X 60'
	2C		5, Inside	9,300	650		
SP	2D	Sears Point Dam	5, Inside	10,000	900	CENT	20' X 40'
L	2B, 2D	Lakeville Dam	4, Inside	4,200	215	CENT	20' X 40'
AR	2B	Adobe Road Dam	5, Inside	9,100	325	CENT	20' X 60'
TR	3A	Two Rock Dam	4, Inside	5,900	160	CENT	20' X 40'
B	3B	Bloomfield Dam	4, Inside	5,800	340	CENT	20' X 40'
CR	3C	Carroll Rd Dam	4, Inside	5,900	340	CENT	20' X 40'
VF	3D	Valley Ford Dam	4, Inside	5,900	400	CENT	20' X 40'
H	3E	Huntley Dam	4, Inside	5,800	300	CENT	20' X 40'
SEB	2,3	Delta Pond	4, Outside	3,200	400	VT	20' X 20'
FGS	2,3	West College Ponds	2, Outside	1,600	150	VT	20' X 20'
FGB	2,3	Redwood Hwy N. Of Fountaingrove Pkwy	2, Inside	1,600	125	CENT	20' X 20'
BVS	2,3	West College Ponds	2, Outside	2,800	350	VT	20' X 20'

Table 3.3-4

Pump Stations Characteristics

Pump Station	Alternative or Subalternative	Location	Number of Pumps[1]	Pump Capacity (gpm, each)	Motor HP (each pump)	Pump Type[2]	Building Size [3]
BVB	2,3	Sonoma County Fairgrounds	2, Inside	1,600	75	CENT	20' X 20'
G1	4	Delta Pond	4, Outside	5,100	900	VT	20' X 40'
G2	4	Hwy 128 @ Pine Flat Road	5, Inside	3,800	1,500	CENT	30' X 60'
G3	4	Pine Flat Road	5, Inside	3,800	1,250	CENT	30' X 60'
G4	4	Pine Flat	5, Inside	3,800	1,750	CENT	30' X 60'
SBPS-2	2C	Petaluma Hill Rd.	2, Inside	2,500	40	CENT	10' X 10'
SBPS-3	2A,B,C,D	Petaluma Hill Rd.	2, Inside	1,300	60	CENT	10' X 10'
SBPS-7	2D	Petaluma Hill Rd.	5, Inside	9,400	225	CENT	20' X 60'
SBPS-8	2A,B,C,D	Petaluma Hill Rd.	2, Inside	2,350	130	CENT	20' X 20'
SBPS-9	2D	E. Railroad Ave.	2, Inside	2,600	25	CENT	10' X 10'
SBPS-10	2A,B,C,D	Adobe Rd.	6, Inside	18,400	900	CENT	20' X 60'
SBPS-11	2B,C,D	Adobe Rd.	3, Inside	3,200	40	CENT	20' X 20'
SBPS-12	2D	Lakeville Rd.	4, Inside	7,600	500	CENT	20' X 60'
WBPS-1	3E	Martinoni Rd.	2, Inside	225	5	CENT	10' X 10'
WBPS-3	3E	Seavey Rd.	2, Inside	300	15	CENT	10' X 10'
WBPS-4	3E	Spring Hill Rd.	2, Inside	1,560	110	CENT	20' X 20'
WBPS-5	3E	Pepper Rd.	4, Inside	7,560	475	CENT	20' X 60'
WBPS-6	3E	Valley Ford Rd.	2, Inside	680	20	CENT	20' X 20'

Table 3.3-4

Pump Stations Characteristics

Pump Station	Alternative or Subalternative	Location	Number of Pumps[1]	Pump Capacity (gpm, each)	Motor HP (each pump)	Pump Type[2]	Building Size [3]
WBPS-7	3	Canfield Rd.	2, Inside	665	40	CENT	20' X 20'
WBPS-8	3C,D	Valley Ford Rd.	2, Inside	820	10	CENT	20' X 20'
LBPS-1	2,3	Green Valley Rd.	2, Inside	220	5	CENT	10' X 10'
LBPS-2	2,3	Graton Rd.	3, Inside	5,060	175	CENT	20' X 60'
LBPS-3	2,3	Bodega Hwy.	2, Inside	750	35	CENT	20' X 20'
LBPS-4	2,3	Burnside Rd.	2, Inside	420	35	CENT	20' X 20'

Source: Parsons Engineering Science, Inc. August 1995

Notes:

1 Includes one stand-by pump; i.e., number of pumps which could be operating at any one time totals one less than number listed. Pumps located inside or outside building, as indicated.

2 vt = vertical turbine, cent = centrifugal, sub = submersible

3 All buildings would be masonry construction, single story, with peaked metal roofing panels. The buildings would house pump control panels, instrumentation, and pumps and will include noise attenuation insulation and features

prepared by the City. If necessary, the City would use its powers of condemnation to acquire property necessary to construct Project facilities.

Electrical Service to Pump Stations

Most of the pump stations can be served from existing electrical distribution lines running along public roads and, therefore, long new distribution lines would not be required. These pump stations, located along public roads, would be served with electrical power by a short overhead or buried run from a nearby existing electrical poleline (See Table 3.3-5).

However, some pump stations would be located too far from existing electrical service lines, and would therefore require installation of new service lines. Most of these new service lines would be about 100 feet long, although four pump stations would require new services between 200 and 250 feet long and eleven of the stations would require new high-voltage transmission lines (either 115kv or 12kv) from 2,200 feet to 45,000 feet long. These new high-voltage lines would be overhead, with short underground runs at either end. The 115kv lines would have wood poles 60 to 70 feet tall. The 12kv lines would be mounted on lower poles approximately 40 to 50 feet tall with a spacing of 300 to 500 feet. New conductors would also need to be installed along some existing polelines to reinforce facilities to serve some of the pump stations. Transformers associated with the overhead power lines would be bolt mounted on the poles. Underground lines would have pad mounted transformers. These pads, approximately 6 feet by 6 feet, would be concrete. In addition, new substations would be required for pump stations at the Meadowlane Ponds; at the Sears Point reservoir; on Adobe Road near East Railroad Avenue; and on Pine Flat Road along the geysers pipeline route.

Five of the pump stations would need to have electrical substations constructed at the sites. A new 230 kV substation would be required at pump station G-3, where the new 12 kV electrical line to pump stations G-2 and G-4 would begin. The other new substations, at pump stations G-2, G-4, S, SP and SBPS, would be smaller, occupying an area of approximately 200 square feet and approximately 6 to 8 feet high.

Urban Irrigation Pump Stations (Alternatives 2 and 3)

For the Fountaingrove urban irrigation system, two 150-horsepower pumps (one for standby operation) would be located at the source pump station adjacent to the West College Ponds. A booster pump station with two 125-horsepower booster pumps (one for standby operation) would be located adjacent to Fountaingrove Business Park, as shown in Figure 3.1-5. The source pump station would operate for 24 hours a day and the booster pump station at Fountaingrove Business Park would operate up to 12 hours a day. Each source and booster pump would have a capacity of up to 1,600 gallons per minute.

Table 3.3-5

Electrical Services for Pump Stations

	Service Information					
Pump Station	Service Voltage	Alternative Service Voltages	Transformer Type	Type of Service	New Service Length	Notes
AR	12 kV	277/480V or 4160V	PM	UG	100'	
ARSW	12kV	277/480V or 4160V	PM	OH/UG	1000'	Add 3rd phase to appx. 1500' of existing line. Extend new OH line appx. 1000' to service location.
B	12kV	277/480V or 4160V	PM	OH/UG	2500'	Extend new OH line appx. 2500' to service location
BVB	277/480V		PB	OH	100'	
BVS	277/480V		PM	UG	100'	
CR	12kV	277/480V or 4160V	PM	UG	100'	
FGB	277/480V		PM	UG	250'	
FGS	277/480V		PM	UG	100'	
G1	12kV	277/480V or 4160V	PM	UG	200'	
G2	12kV		N/A	OH	45000'	See G32
G3	12kV					Add 230kV PG&E Substation with appx. 45000' OH line extension to stations G2, G3, & G4.
G4	12kV					See G3
H	12kV	277/480V or	PM	UG	100'	Add 3rd phase to appx. 6000' of existing line.

Table 3.3-5

Electrical Services for Pump Stations

	Service Information					
Pump Station	Service Voltage	Alternative Service Voltages	Transformer Type	Type of Service	New Service Length	Notes
		4160V				
L	12kV	277/480V or 4160V	PM	UG	100’	Add 3rd phase to appx. 2700’ of existing line.
LBPS-1	120/240v		PB	OH	100’	
LBPS-2	277/480V		PM	UG	100’	
LBPS-3	277/480V		PB	OH	100’	
LBPS-4	277/480V		PB	OH	100’	
S	115kV	12kV	N/A	OH	15400’	15400’ 115kV OH Transmission Extension from Stony Point Road to Customer Substation or PG&E Unit Sub at Laguna Plant.
SBPS-10	115kV		N/A	OH	4600’	4600’; 115kV OH Transmission Extension to Customer Substation or PG&E Unit Substation, along Railroad Ave./Petaluma Hill Road.
SBPS-11	277/480V		PB	OH	100’	Add 3rd phase to appx. 900’ of existing line.
SBPS-12	12kV	277/480V or 4160V	PM	UG	100’	
SBPS-2	277/480V		PB	OH	100’	
SBPS-3	277/480V		PB	OH	100’	
SBPS-7	12kV	277/480V or	PM	UG	100’	

Table 3.3-5

Electrical Services for Pump Stations

Pump Station	Service Information					
	Service Voltage	Alternative Service Voltages	Transformer Type	Type of Service	New Service Length	Notes
		4160V				
SBPS-8	277/480V		PB	OH	100'	
SBPS-9	120/240v		PB	OH	100'	
SEB	12kV	277/480V or 4160V	PM	UG	200'	
SP	115kV	12V	N/A	OH	16000'	9500' 115kV OH Transmission Extension to Customer Substation or PG&E Unit Sub.
T	12kV	277/480V or 4160V	PM	OH/UG	7000'	Extend new OH line appx. 7000' to service location.
TASW	12kV	277/480V or 4160V	PM	OH/UG	2200'	Add 3rd phase to appx. 1500' of existing line. Extend new OH line appx. 2200' to service location.
TCWS	12kV	277/480V or 4160V	PM	UG	100'	
TR	277/480V		PM	OH/UG	3000'	Extend new OH line appx. 3000' to service location.
VF	12kV	277/480V or 4160V	PM	UG	200'	Add 3rd phase to appx. 500' of existing line.
WBPS-1	120/240v		PB	OH	100'	Add 3rd phase to appx. 1000' of existing line.
WBPS-3	120/240v		PB	OH	100'	
WBPS-4	277/480V		PB	OH	100'	

Table 3.3-5

Electrical Services for Pump Stations

	Service Information					
Pump Station	Service Voltage	Alternative Service Voltages	Transformer Type	Type of Service	New Service Length	Notes
WBPS-5	12kV	277/480V or 4160V	PM	UG	100'	
WBPS-6	120/240v		PB	OH	100'	
WBPS-7	277/480V		PB	OH	100'	
WBPS-8	120/240v		PB	OH	100'	

Source: Pacific Gas & Electric, October 1995

Abbreviations:
UG = Underground
OH = Overhead
PB = Pole Bolt Mounted
PM = Pad Mounted

Source pumps for the Bennett Valley/East Santa Rosa system would be located in the same source pump station as for the Fountaingrove system. Two 325-horsepower pumps (one for standby operation) with a capacity of 2,800 gallons per minute each would be required at the source pump station. Two 75-horsepower booster pumps (one for standby operation) with a capacity of 1,550 gallons per minute each would be required at the booster pump station. Both sets of pumps would operate at night for direct deliveries to the night-time irrigation sites and during the day to fill the storage ponds at the Bennett Valley Golf Course.

Pumps would be automatically controlled to maintain mainline pressure, with high pressure override shutoff, and a new electrical service would be provided to the pump stations.

Meadowlane Pump Station (S) (Alternatives 2 and 3 - All Subalternatives)

To deliver reclaimed water to the storage reservoir sites, a new pump station would be located adjacent to the existing reclamation system pump station at the Meadowlane Ponds across from the Laguna Plant. The station would contain four 750-horsepower pumps mounted outdoors. It would have a peak capacity of 26 MGD and would operate primarily during the months of December to May to fill storage reservoirs, but may operate during summer months for irrigation distribution purposes (at a lower rate to maintain line pressure). Pumps would be manually controlled, with high pressure override shutoff. A new electrical service would be provided to this pump station because the demand load would exceed the existing service to the Laguna Plant.

Distribution, Booster, and Stormwater Pump Stations (Alternatives 2 and 3 - All Subalternatives)

To distribute stored water from the reservoirs to the agricultural irrigation areas one pump station would be required near the foot of each reservoir dam. In addition to these pump stations, Tolay Extended, Tolay Confined, and Adobe Road reservoirs also require a storm water pump station to divert runoff around and downstream of the reservoir. Booster pump stations would also be required to lift water up to the higher elevation zones of the irrigation distribution system. Characteristics of these pump stations are identified in Table 3.3-4.

To irrigate many of the private parcels in the West County or South County would require installation of a small booster pump station on private property to boost the pressure coming off the distribution mains installed within the public right-of-way. The locations of these pump stations have not been determined; however they would be located on private agricultural parcels. These pumps are typically under 3 feet tall and 3 feet in diameter, with motors up to 50 horsepower in size.

Geysers Pump Stations (Alternative 4)

To deliver reclaimed water to the geysers steamfield area a series of four high pressure pump stations would be required to transport the water about 35 miles from Delta Pond to the geysers area northeast of Healdsburg. The first station would be located at Delta Pond and the second near the junction of Pine Flat Road and State Highway 128. From there two more pump stations would lift the water 3,300 feet to two, 1 million gallon storage tanks proposed to be built on a ridge above the Geysers Geothermal Reserve. From there, the water would be gravity fed to between 10 and 15 injection wells located throughout the northwest portion of the geysers area.

The pump stations were sited partially to facilitate electrical service to the sites. The first two stations would be located near existing electrical service easements, although a larger service would need to be strung. The last two stations were sited near existing high voltage transmission lines with the intent that a drop could be made to a new substation to transform power for the pumps.

The four pump stations would act to lift the water in steps up to the geysers. From the source pump station at the Delta Pond, the pipeline would discharge water into a tank at each successive pump station. The tank would serve as a supply to that station for the next lift. The tanks would be 500,000-gallon capacity, about 60 feet in diameter and 24 feet high. Isolation valves are proposed for the pipeline to allow sections to be isolated and drained into the 500,000-gallon tank, if necessary to facilitate pipeline maintenance.

Each pump station would have a surge arrestor tank system to protect the pumping system from hydraulic transients due to power failure. These tanks would be about 10 feet in diameter and 30 feet long, and require an air compressor which would be mounted in the pump station building.

Pumps would be automatically controlled, based on the delivery tank water level, with high pressure and low pressure override shutoff. A new telephone circuit for a telemetry alarm system and a new electrical service would be provided to each pump station.

Discharge Pump Stations (Alternative 5 - All Subalternatives)

No additional pumping capacity would be required for Alternative 5A, Discharge to the Russian River; two existing pump stations would be utilized. The existing Delta Pond pump station in conjunction with the North Pipeline Denner Ranch booster pump station would deliver water from Delta Pond or directly from the Laguna Plant to a proposed outfall structure on the east bank of the Russian River.

No additional pumping capacity would be required under Alternative 5B, which utilizes the existing discharge points in the Laguna de Santa Rosa.

AGRICULTURAL IRRIGATION (ALTERNATIVES 2 AND 3)

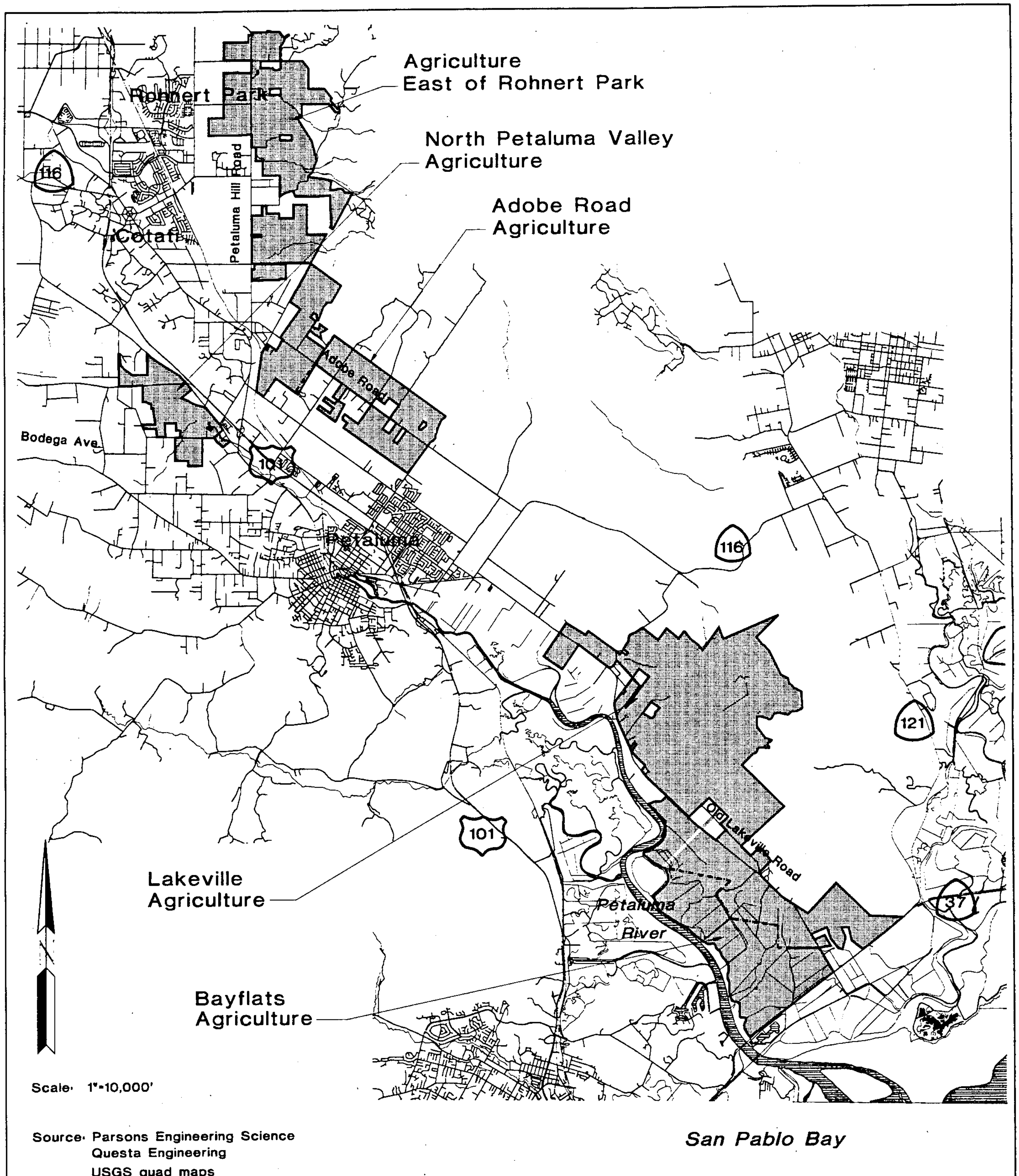
The South County and West County alternatives involve increased acreage of agricultural irrigation. For Alternative 2, an additional 3,800 acres of agricultural irrigation would be required in the South County. For Alternative 3, an additional 6,200 acres of agricultural irrigation would be required in the West County. If agricultural irrigation in the Sebastopol area is utilized (2,200 acres) the additional agricultural irrigation requirements are reduced to 2,600 acres for the South County and 4,300 acres for the West County. As these three major potential irrigation areas have different climatic and soil conditions, the potential water consumption rate is different for each area, and consequently, the acreage required to accommodate the projected volumes of reclaimed water will vary between the West County and South County. Annual average irrigation application rates are 2.9 acre feet for South County, 2.0 acre feet for West County, 1.7 acre feet for Sebastopol, and 3.0 acre feet for bay flats.

Not all property owners in these areas would be willing to use reclaimed water, and irrigation setbacks from residential areas and traffic corridors must be provided. Consequently, the proposed irrigation acreage must be larger than theoretically required. About 19,400 acres of privately owned potential agricultural irrigation property have been evaluated in the West County area, 2,800 acres in the Sebastopol area, and 16,500 acres in the South County area as part of this Draft EIR/EIS (see Figures 3.3-11 through 3.3-13).

Reclaimed water that is delivered to these areas would be distributed by additional local distribution pipelines to irrigation systems operated by individual users. The specific location and design of these local distribution system pipelines and the irrigation systems have not been determined.

A typical agricultural irrigation field layout would be based on a 40 acre parcel irrigated by means of a buried 6-inch plastic pipe mainline on the parcel, feeding either a single self-propelled irrigation machine (which consists of pipe segments mounted on wheels operating in a circular motion or in a line) or a network of hand-set surface-mounted aluminum pipe and sprayfield sprinklers.

The City of Santa Rosa would not be responsible for directly applying the reclaimed water, or managing the farming, dairy, or ranching operations. However, Irrigation Management Guidelines have been developed to identify the procedures and practices for proper management of agricultural lands for which it is furnishing reclaimed water. The objective of the guidelines is two-fold: first, that the system as a whole, and each irrigation system, is designed and managed to avoid or reduce environmental impacts to the maximum extent that current technology allows; and second, where monitoring indicates trends toward adverse impacts are occurring, that steps are taken to remedy the situation. The Irrigation Management Guidelines that are considered as part of the Project are included in Section 2.2 of this document and would be subject to monitoring as a part of the Mitigation and Monitoring Program.



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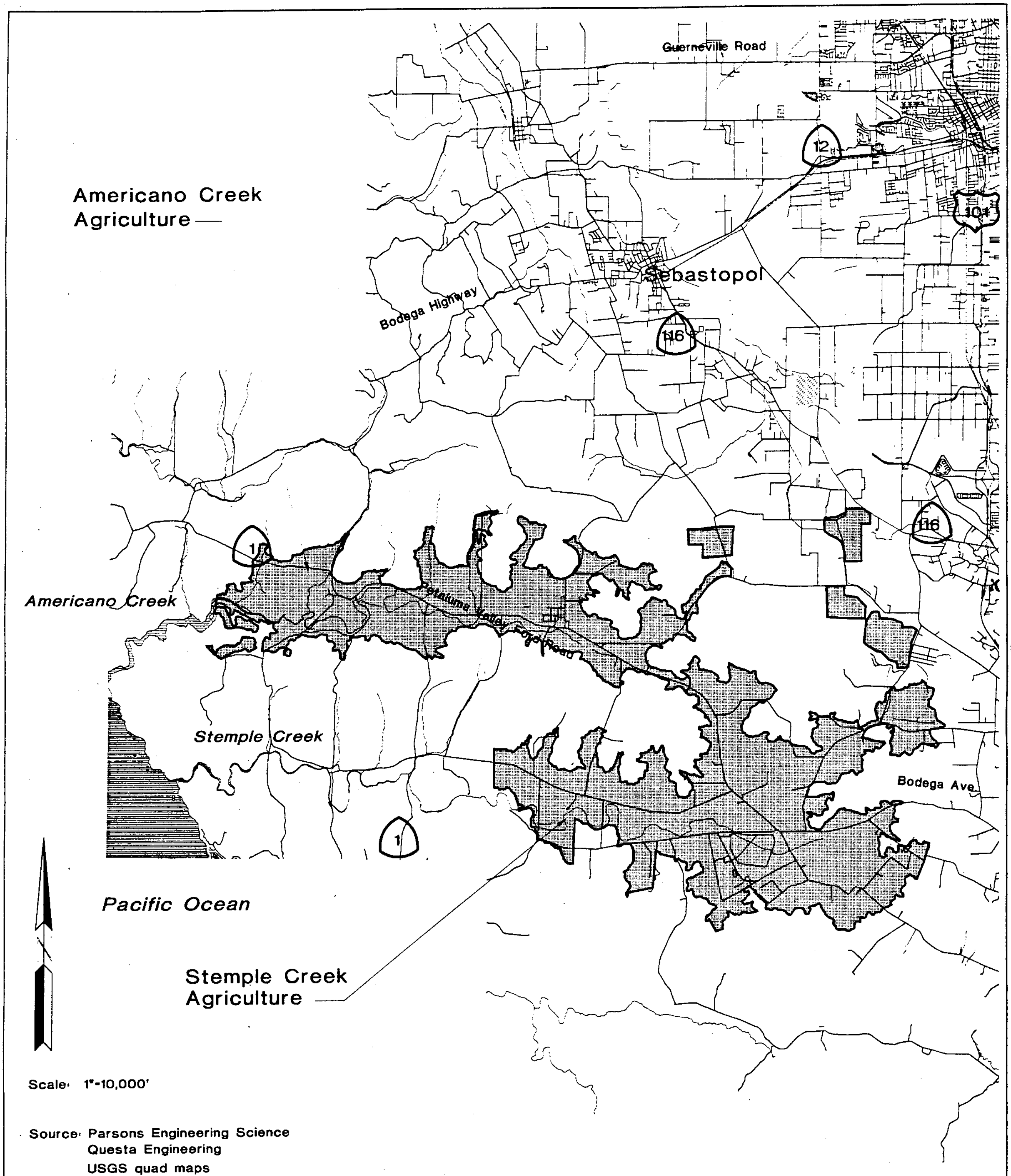
SOUTH COUNTY AGRICULTURAL IRRIGATION AREAS

Figure 3.3-11



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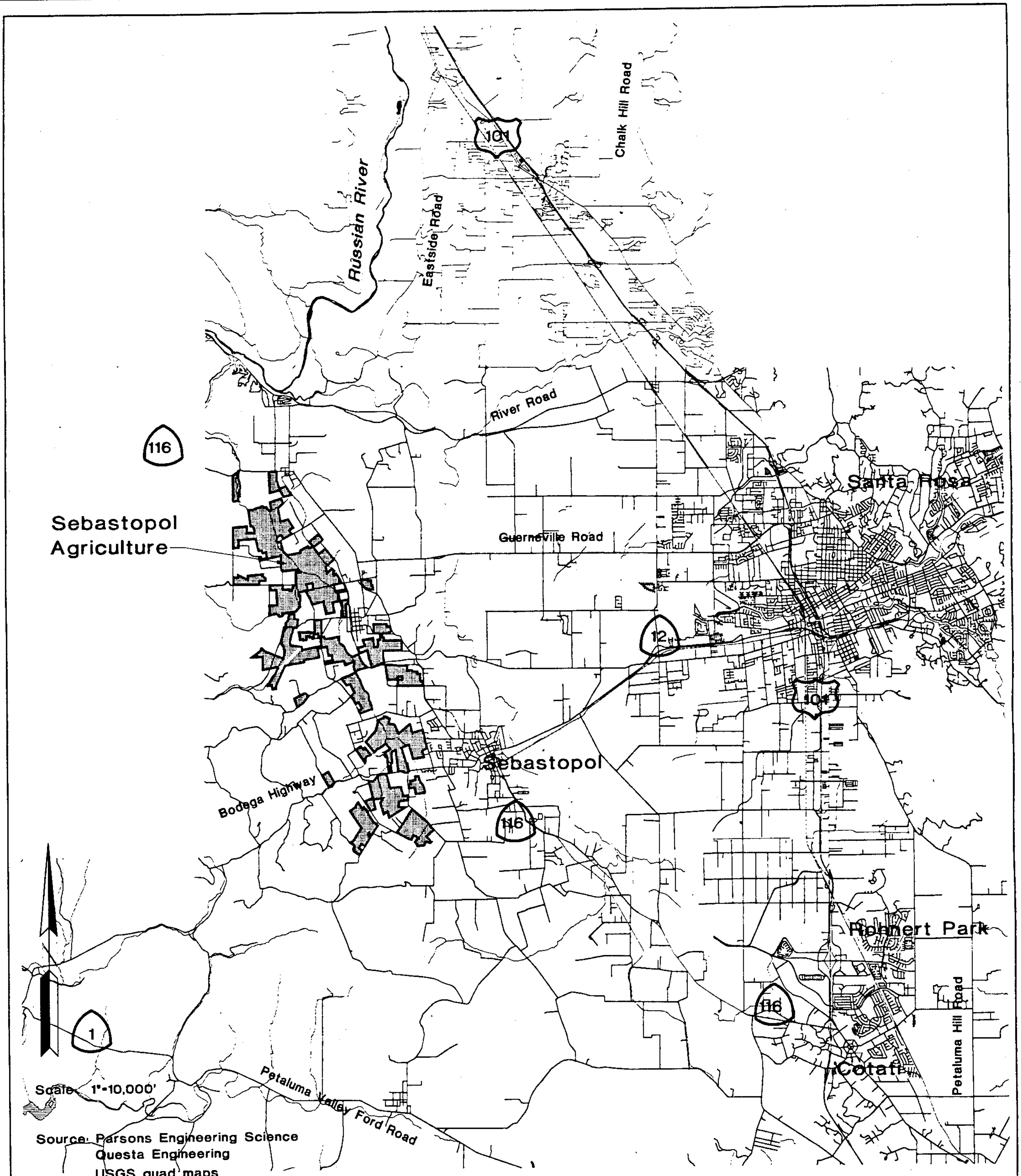
WEST COUNTY AGRICULTURAL IRRIGATION AREAS

Figure 3.3-12



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SEBASTOPOL AGRICULTURAL IRRIGATION AREAS

Figure 3.3-13

Through implementation of the Irrigation Management Guidelines, the City controls management practices that are used on land receiving reclaimed water. The City would provide management oversight, monitoring and enforcement guidelines, and would require appropriate education of irrigation water users. The Irrigation Management Guidelines include procedures used to insure that only suitable land is brought into irrigation and that erosive and environmentally sensitive lands are avoided and protected. The proper use and management of applied irrigation water to avoid runoff and subsurface flows is described, and the required elements of individual or site specific Irrigation Conservation and Management Programs are outlined. The Irrigation Conservation and Management Programs would be required for all agricultural property owners who wish to receive reclaimed water for irrigation. These Programs would be prepared by City reclamation staff, working with Resource Conservation District technical staff. In addition to the Irrigation Conservation and Management Programs, the Irrigation Management Guidelines contain design guidelines and recommended Best Management Practices. On-going management by the City would include consultation on irrigation scheduling, soil erosion control, fertilizer and herbicide/pesticide recommendations, and crop and pasture management and problem solving. A monitoring network and required sampling and analysis would be coordinated with the Regional Water Quality Control Boards.

Although the Irrigation Management Guidelines are intended to avoid runoff and ponding, it is not likely that these events can be completely eliminated. Data from the 1993 and 1994 City of Santa Rosa Reclamation Annual Reports indicate the range of reported incidences of irrigation runoff and ponding due to faulty operation or pipeline leakage. During this two-year period there were a total of 162 incidences reported (114 in 1993 and 48 in 1994). Nineteen of the 1993 incidences and eight of the 1994 incidences involved runoff to waterways; the remainder involved ponding or contained runoff. The maximum volume of runoff reported was 34,000 gallons. The majority of incidences involved runoff or ponding of less than 1,000 gallons.

GEYSERS STEAMFIELD (ALTERNATIVE 4)

This component would supply reclaimed water to the geysers for injection into the geothermal steamfield. The intent is to reduce the decline in steam production, prolonging the life and economic production level of the steamfield and the geothermal power plants supplied by the steamfield. This would be a beneficial reuse of reclaimed water with an economic value. The geysers steamfield component includes the following elements, which in addition to the transmission pipeline, pump stations, and electrical service described in previous sections compromise the Geysers Alternative:

- Two 1,000,000 gallon storage tanks at the end of the transmission pipeline, to serve as a reservoir for gravity distribution to the injection wells. The tanks would be above grade, each about 80 feet in diameter and 30 feet high. They would be constructed on a high point along the ridge, which would be graded

down to create a flat area of sufficient size for the tanks, and the existing dirt road from Pine Flat Road to the tank site would be regraded and graveled.

- Distribution pipelines would convey water from the two storage tanks to the geysers injection wells, primarily mounted above ground on pipe supports. Pipelines would range from 12 to 36 inches in diameter, and air/vacuum release valves, blowoff valves, and isolation valves would be provided.
- Ten to fifteen water injection wells distributed around the central and northwest portion of the geysers geothermal fields. These are existing steam extraction wells which would be converted to water injection wells.

Acquisition of property would be required for construction of the storage tanks as well as segments of pipeline leading from Pine Flat Road to the storage tanks, and from the tanks to the geysers steamfield area. The anticipated area of the site to be acquired for the storage tanks would be approximately seven acres. Parcels on which the storage tanks and associated pipelines are located are listed in Appendix D-7. The City of Santa Rosa would attempt to purchase only that portion of a parcel that is needed. In those cases where the City would be required to purchase the entire parcel, the City would maintain the land use existing on the remainder portion at the time of acquisition, unless subsequent environmental documentation is prepared by the City. If necessary, the City would use its powers of condemnation to acquire property necessary to construct Project facilities.

This alternative proposes the delivery of about 75 percent of the reclaimed water leaving the Laguna Plant to the geysers on an average annual basis and about 25 percent to the existing reclamation system (including existing Laguna irrigation fields and the existing storage ponds in the Laguna). Total average annual water delivery to the geysers would approach 6,350 million gallons at system design capacity, for an average daily delivery of about 17.4 mgd. The peak monthly delivery would occur December through February at about 20 mgd, and the minimum delivery in July through August at about 15 mgd. During peak wet weather events, releases to the Laguna would continue to be utilized for brief periods. The maximum rate of such discharge would be less than the 1 percent maximum discharge rate currently permitted.

DISCHARGE (ALTERNATIVE 5)

This Project component has two options, as shown in Figure 3.1-8: a new discharge at the Russian River and continued discharge into the Laguna creeks from the existing storage ponds.

The new discharge at the Russian River would have a design discharge rate of 20%. The existing Laguna discharge would have a design discharge rate of 1% for alternatives 2 and 3. Alternative 4 would discharge up to 1% of river flow during peak wet weather events. The Laguna Discharge Alternative has a design discharge rate of 20%. For alternatives 2 and 3, a range of discharge rates between 1% and 20% may be considered

as described in the *Range of Discharge Evaluation* (Harland Bartholomew & Associates, Inc. 1996).

Russian River Discharge (Alternative 5A)

A new outfall structure would be located on the east bank of the Russian River, approximately two miles upstream of the Sonoma County Water Authority water supply intakes (see Figure 3.1-8). The structure consists of a vault with a valve to maintain pressure in the pipeline; 40 feet of 54-inch pipe to stabilize flow downstream of the valve; a concrete baffle outlet structure to anchor the pipe and reduce foaming and turbulence prior to discharge to the river; a flap on the end of the discharge pipe; and concrete erosion control wings and ramp into the river channel. The discharge structure is located at an elevation above the summer flow elevation in the river.

Acquisition of property would be required for construction of the new outfall structure. The anticipated area of the site to be acquired for each pump station would not exceed one acre. The parcel on which the proposed outfall structure is located is listed in Appendix D-7. The City of Santa Rosa would attempt to purchase only that portion of a parcel required. In those cases where the City would be required to purchase the entire parcel, the City would maintain the land use existing on the remainder portion at the time of acquisition, unless subsequent environmental documentation is prepared by the City. If necessary, the City would use its powers of condemnation to acquire property necessary to construct Project facilities.

Laguna Discharge (Alternatives 3, 4, and 5B)

No new construction would be required. There are two outlets to Santa Rosa Creek at Delta Pond, a 48-inch diameter outlet and a 36-inch diameter outlet. Two additional outlets to the Laguna de Santa Rosa exist at Meadowlane Pond, a 36-inch diameter outlet and a 24-inch diameter outlet.

CONTINGENCY PLAN (ALTERNATIVES 2, 3, AND 5)

The Contingency Plan is designed to reduce the incidence of discharges to the Russian River above the design discharge rate for Alternatives 2, 3, and 5. The Project facilities are designed to have a 95 percent reliability, which means that "contingency volumes" are produced in 1 of every 20 discharge months (about once every two to three years). This reliability was determined in agreement with the North Coast Regional Water Quality Control Board. Temporary measures are needed during contingency events to manage such volumes. Contingency volumes are defined as monthly reclaimed water volumes in excess of that which may be stored, irrigated, or discharged to the Russian River under the design discharge rate. Contingency program measures were selected based on ease of implementation and low capital cost. All of the contingency measures under consideration use the same facilities that would be utilized under normal discharge conditions. There are no contingency volumes for Alternative 4, as the maximum

discharge to the Russian River under this alternative would not exceed the 1% discharge rate.

Contingency program measures are prioritized for implementation as follows: 1) winter irrigation, 2) emergency conservation, 3) contingency storage, and 4) contingency discharge. The measures are prioritized based on ease of implementation and environmental acceptability. Contingency discharge via the Laguna is the least acceptable of the four alternative measures because the primary purpose of the contingency program is to avoid discharge to the River in excess of the design rate, except under the most extreme circumstances. Emergency conservation would require considerable public information and support. Public information campaigns during normal operating conditions should be communicated judiciously; otherwise emergency water conservation may not be perceived as an "emergency" by the public, diminishing its effectiveness over time. Winter irrigation facilities are in place and, therefore, should be the first measure utilized during a contingency event. Contingency storage adds 5 percent to the design storage volume in the reservoirs and would be the second measure to be utilized as required. Contingency storage will be available during dry periods (when contingency storage is needed), because reclaimed water production is reduced during dry periods (less inflow and infiltration).

When contingency discharge occurs, the maximum monthly Russian River discharge rates are estimated to be 7.3%, 13.4%, and 28.3% for the 5%, 10%, and 20% design discharge rates respectively. There would be no contingency discharge for the 1% design discharge Project and contingency discharge would occur in 4 months or less in 70 discharge seasons for each of the 5%, 10%, and 20% discharge options. Contingency discharge events occur rarely; the monthly water balance model showed a maximum of four contingency discharges over the 70-year period of record for the 20% design discharge Project. Other discharge rates would require contingency discharge of even less frequency. The contingency discharge rate associated with each "design" discharge rate would be approved and contained in the permit issued by the North Coast Regional Water Quality Control Board. Additional information about the Contingency Plan may be found in Technical Memorandum *Water Balance Contingency Plan*, (Parsons Engineering Science, Inc. 1995s).

3.4 COST OF ALTERNATIVES

An estimate of construction costs and costs of operation and maintenance for the Project alternatives was prepared at a planning level of detail to identify the major costs and allow a relative cost comparison between alternatives. Due to the uncertainty at this time about the final design of any of the alternatives, the cost estimates should be considered preliminary and subject to revision once an alternative is selected and Project design is completed.

Table 3.4-1 provides an overall summary of the construction cost and the annual cost for operation and maintenance for each of the alternatives, along with the projected land purchase costs, engineering and administrative costs, and a total equivalent present worth cost. Also, the non-recurring operation costs associated with Contingency Plan implementation are shown in this table.

The cost estimate is based on the following assumptions:

- Costs for development and management (including the services of agricultural specialists), over a five-year startup period, for the agricultural irrigation areas are included. Otherwise, labor costs for current and additional City personnel who will regularly operate and maintain the Project facilities are not included.
- The cost estimate is based on unit costs for construction labor and materials as of the third quarter of 1995.
- The addition of nitrogen removal water treatment facilities is included in the cost estimate for both discharge subalternatives.
- The cost estimate includes no off-setting revenue from sale of reclaimed water for irrigation or from the value of electrical power produced at the geysers due to injections of reclaimed water. No incentive payments to land owners to take reclaimed water are included in the cost estimate, except for Contingency Plan winter irrigation.

Additional information about the estimated Project cost may be found in *Alternative Projects Construction Cost Estimate*, November 1995 (Parsons Engineering Science, Inc. 1995a).

- In addition to these estimates of Project cost for the five alternatives, additional estimates of cost were prepared for alternatives 2 and 3 to identify costs differences for a Project under these alternatives with design discharge rates between a 1% rate (which is the basis for alternatives 2 and 3) and a 20% rate (which is the basis for Alternative 5). These cost estimates have been prepared at design discharge rates of 5%, 10%, and 15% for each of the subalternatives under Alternative 2 and 3. The several assumptions and criteria listed above were also used in preparation of the cost estimates for the 5%, 10% and 15% discharge rates.

Table 3.4-1

Cost Estimate by Alternative

(thousands)

	Capital Costs						
Alternative	Land Purchase	Engineering, Administration Legal	Construction	Total	Annual Operation and Maintenance Costs	Total Present Worth [1] [2] [3]	Contingency Plan Operation and Maintenance Costs (Non-Recurring)
1 - No Action/No Project	$0	$0	$0	$0	$0	$0	$0
2A - Tolay Extended	$8,487	$39,631	$264,208	$312,326	$2,513	$340,014	$433
2B - Adobe Road and Lakeville Hillside	$4,734	$45,324	$302,158	$352,216	$2,411	$378,780	$437
2C - Tolay Confined	$4,242	$45,528	$303,517	$353,287	$2,627	$382,231	$438
2D - Sears Point and Lakeville Hillside	$3,883	$48,631	$324,206	$376,720	$3,153	$411,460	$558
3A - Two Rock	$1,973	$31,883	$212,554	$246,410	$1,648	$264,568	$297
3B - Bloomfield	$1,858	$36,626	$244,175	$282,659	$1,745	$301,886	$297
3C - Carroll Road	$1,907	$31,506	$210,043	$243,456	$1,753	$262,771	$297
3D - Valley Ford	$2,057	$32,533	$216,888	$251,478	$1,785	$271,145	$297
3E - Huntley	$2,354	$32,811	$218,739	$253,904	$1,713	$272,778	$298
4 - Geysers Recharge	$209	$27,136	$180,907	$208,252	$6,683	$281,885	$0
5A - Discharge to Russian River	$33	$8,337	$55,583	$63,953	$97	$65,022	$0
5B - Discharge to Laguna	$0	$6,046	$40,306	$46,352	$0	$46,352	$0

Source: Parsons Engineering Science, Inc., November 1995

Notes:
1. Includes annual O&M capitalized at 6.5% interest over 20 years; present worth factor = 11.018
2. Does not include credit for annual revenue income from sale of reclaimed water or value of crops produced under Alternatives 2A through 3E, or value of significant electrical energy produced due to Alternative 4.
3. Assumes stable pumping energy consumption (at design year value) and energy cost for 20 years.

In addition, several new assumptions and criteria were used in the cost estimates for the 5%, 10%, and 15% discharge rate options under alternatives 2 and 3 projects because the storage requirements, piping and pumping requirements, and irrigation acreage requirements will be reduced from the 1% projects. Based upon the storage requirements for the 5%, 10%, and 15% discharge rates, two alternatives will be modified or eliminated from consideration under one or more of the options.

- Alternative 2A, the expanded Tolay reservoir, will be eliminated from consideration under the 10% or 15% options because the reduced storage requirement will result in a relatively large and shallow impoundment with a relatively large area of shallow and turbid water which will not be available to the outlet works and irrigation pump, and will aggravate the growth of algae.
- Alternatives 2B and 2D: Under the 5%, 10%, and 15% option, the reduced storage requirements mean that either Lakeville Hillside reservoir or the Adobe Road reservoir alone will be sufficient these alternatives. Also, under the 15% option, the Lakeville Hillside reservoir by itself could be used.

In addition to modification of these alternatives, components considered under 5%, 10%, and 15% options will be affected as follows:

- Pipelines. Pipeline sizes to the reservoirs will be reduced to account for the reduced volume (and flow rate) to actually be delivered to the reservoirs and irrigation areas. For purposes of the cost estimates, it was also assumed that the length of pipelines necessary to carry water from the reservoirs to the agricultural irrigation areas will be less, reflecting the reduced acreage needed for agricultural irrigation.
- Storage Reservoirs. Under the 5%, 10%, and 15% options, the reduced reclaimed water storage requirement will result in a reduced reservoir size, including a lower water elevation, reduced water surface area, and a reduction in height of the main dams, as well as the back dams and saddle dams. (Under the 10% and 15% options, the saddle dam for the Adobe Road reservoir will be eliminated.) However, because these reservoirs are to be constructed in valleys, the reduction in volume does not result in a proportional reduction in the dam height, surface water elevation or surface area of the reservoir. These will change by only a few feet, even under the 15% option. The diversion channels and other facilities for storm water drainage will not be altered under any of the options because these facilities are sized to deal with the storm water flows within the watershed and will not change as a result of reduced storage requirements.
- Pump Stations. Because less volume of water must be delivered to the reservoirs and the reservoirs to the major irrigation areas, the capacity of the pump stations at the Laguna Plant and at the reservoirs will be reduced by about 30% for the 5% option, 50% for the 10% option, and 75% for the 15% option. Also, the number of pump stations required is assumed to be reduced for the purpose of estimating costs for these options, reflecting the decrease in area required for agricultural

irrigation. However, even though the total volume of reclaimed water delivered for irrigation will be less, the amount of water to a given irrigation area might not be reduced, and therefore, the booster pump stations serving the individual irrigation areas will not necessarily be reduced in size.

- Agricultural Irrigation. Because less water will be available for irrigation under the 5%, 10%, and 15% options, less acreage will be required than for the 1% Project (assuming the same rate of application of water). For the purposes of the cost estimates it was assumed that the areas to be irrigated will be those closer to the reservoir site under each alternative. (For example, under the 10% option for Alternative 3B, using the Adobe Road reservoir, it was assumed that the Lakeville and bay flats areas will not be irrigated.) This will allow the length of pipeline and the number of pump stations to be reduced as described above.

The headworks expansion and urban irrigation components will not be affected by any of the options.

Several observations and conclusions have been identified based upon the cost estimates.

- Except for Alternative 4, the relative position of the alternatives is nearly identical under any of the options, indicating that construction cost dominates the present worth value of the projects.
- Once the river discharge exceeds about 6%, Alternative 4 becomes the most expensive Project. Alternative 4 is more expensive than any 10% or 15% Project.
- The West County alternatives have consistently less cost than the South County alternatives.
- For the 15% option, the construction cost of Alternative 2B/D using only Lakeville Hillside reservoir, is the least costly South County alternative, and is nearly equivalent to the West County alternatives.
- The 5% South County alternatives 2A through 2D are nearly equivalent in cost to the 1% West County alternatives.
- The 10% South County alternatives 2A through 2D are nearly equivalent in cost to the 5% West County alternatives.
- Except for the option using only the Lakeville Hillside reservoir, the 15% South County alternatives 2A through 2D are nearly equivalent in cost to the 10% West County alternatives.
- Additional information about the estimated Project cost may be found in the Range of Discharge Evaluation, Appendix A, (Harland Bartholomew & Assocations, Inc. 1996b).

3.5 CUMULATIVE PROJECTS

Cumulative impacts are defined as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines Section 15355). NEPA defines cumulative impact as the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40CFR 1508.7).

IDENTIFICATION OF PROJECTS WITH POTENTIAL FOR CUMULATIVE IMPACTS

Cumulative projects have been identified using two methods (as defined under Section 15130 of the CEQA Guidelines): General Plan projections and the list approach. Projections from the general plans and individual projects are listed in Appendix D-31. Projects were identified relative to the requirements of both CEQA and NEPA:

- Cumulative Project Study Area. Although many resources are affected only by nearby projects, the water quality of a stream or river is affected by all projects within its watershed. We therefore defined the cumulative Project study area as the watershed of all waterbodies potentially affected by the Project alternatives (see Figure 3.5-1).
- General Plan Projections. General plans and general plan EIRs within the cumulative Project study area were obtained. Using these documents, projections of residential, commercial, and industrial projects have been prepared.

  One potentially cumulative project is the City of Santa Rosa's 1996 update of its General Plan. In July of 1996, a few days prior to release of the Draft EIR/EIS, the City may adopt that update. Depending upon what is decided by the City Council, the ultimate population could be as much as 30,000 higher than that projected at buildout of the current General Plan. Any such growth, however, is expected to occur after the year 2010, after the horizon time frame of Santa Rosa's current General Plan, which is used in the EIR/EIS as the basis for analysis of the Project.

  As of the time of writing of the Draft EIR/EIS, it is unknown which General Plan update alternative, if any, will be adopted by the City Council. The calculations of flows for the purpose of sizing the Long-Term Project were completed based on April 1994 projections of the General Plan buildout of each Subregional member. The sizing of the Long-Term Project is therefore based on flows resulting from the buildout of the current General Plan, and if the population increases beyond that projected in the current General Plan, a new proposal for

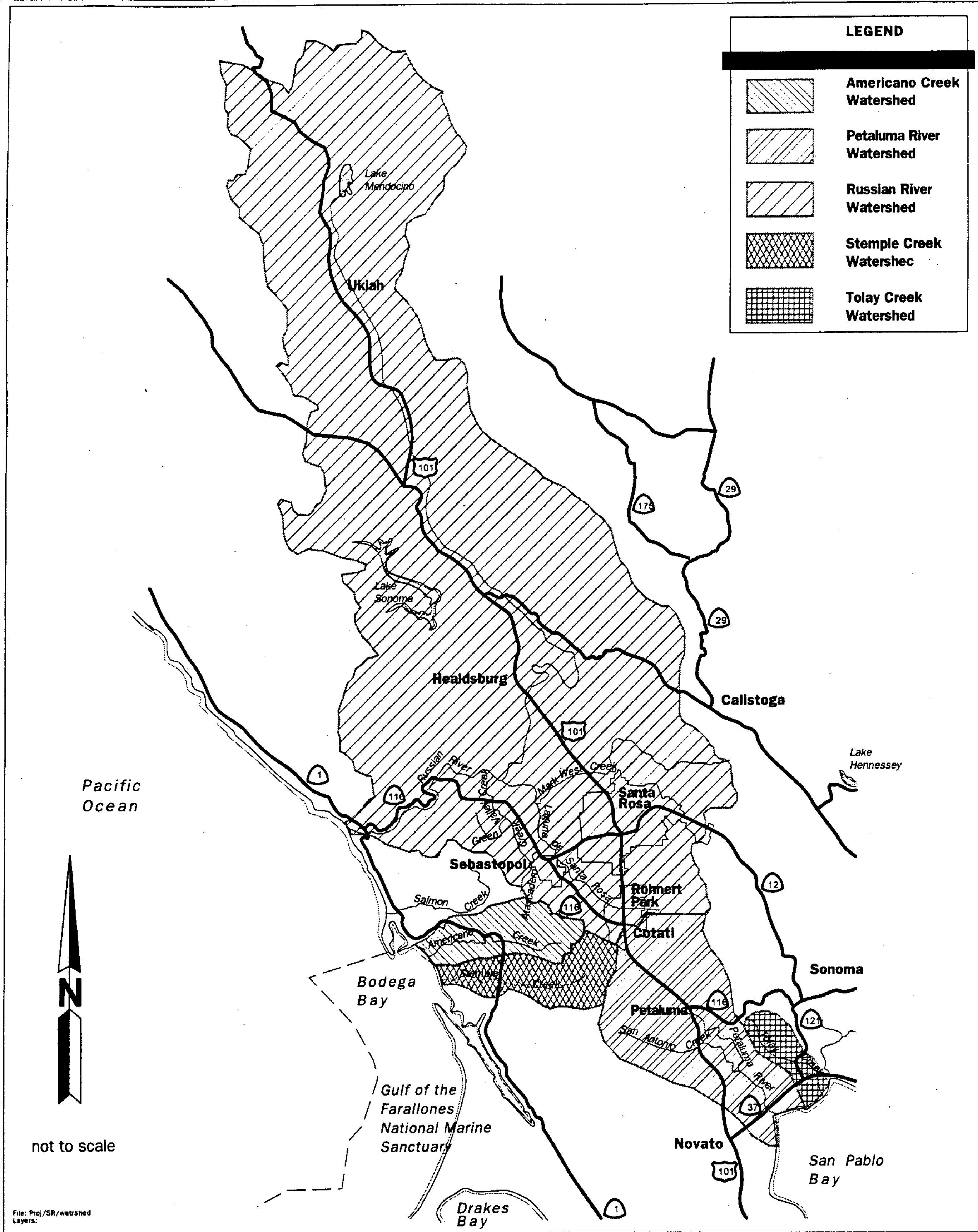

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Figure 3.5-1

CUMULATIVE PROJECTS STUDY AREA

sewage treatment and disposal will be required, as well as compliance with all applicable laws. The potential increase in flows, if any, created by the update will occur after the date used in defining and analyzing the Project and is, therefore, not part of the Project evaluated in the EIR/EIS.

Full evaluation of the update as a cumulative project is not possible for at least three reasons: (1) it is unknown what the City's action regarding the update will be or what conditions might be imposed and therefore what increase in flows might result; (2) it is unknown how sewage treatment for any increase will be accomplished; and (3) any increase is expected to occur after the year 2010, the horizon time frame used in the EIR/EIS as the basis for analysis of the Project.

- The List Approach. The projections included in the general plans were considered the primary tool for identification of cumulative projects. However, individual cumulative projects were identified for two reasons: 1) a number of general plan amendments or updates are in process within the cumulative Project study area; and 2) the general plans and general plan EIRs do not adequately cover projects with impacts on water quality, a primary issue in analysis of the Project alternatives. A list of wastewater projects with a potential for cumulative impacts is included in Section 4.6, Surface Water Quality.
- Past, Present, or Reasonably Foreseeable Projects. The impacts of past and present projects are evaluated in the baseline environmental data presented in the Affected Environment section of the EIR/EIS. Reasonably foreseeable future projects were identified as suggested in the CEQA Guidelines in the discussion following Section 15130: "...the Lead Agency is required to discuss not only approved projects under construction and approved related projects not yet under construction, but also unapproved projects currently under environmental review...". When local agencies were contacted, all projects in their jurisdictions which met these criteria were requested. Projects were included on the cumulative list without limitation in regard to type of environmental documentation available.
- Actions, Regardless of Who Undertakes Them. All municipal, regional, state, and federal agencies with jurisdiction over lands within the cumulative Project study area were contacted, and a list of their public and private projects solicited. All agencies contacted responded, although it was evident that some agencies had more complete lists than others.
- Related Projects. The following types of projects were considered related to the Project alternatives:
  - Actions in or near a waterbody;
  - Actions requiring an Army Corps of Engineers permit for fill;
  - Work along a roadway to be used for a pipeline alignment;

- Residential, commercial, and industrial projects; and
- General plan amendments and updates.

The following types of projects were considered not related to the Project alternatives:

- Public projects under $5,000;
- Landfill closures;
- Acquisition of property;
- Work along a roadway not planned for a pipeline alignment;
- Actions which do not increase the area of impermeable surface or affect water quality, for example improvements to existing pump stations or repavement of existing airport runways;
- Studies and plans; and
- Parks.

EVALUATION OF IMPACTS OF CUMULATIVE PROJECTS

The analysis of cumulative impacts is presented in Chapter 4, Affected Environment and Environmental Consequences, under each discipline. If significant cumulative impacts are identified, mitigation is recommended. Impacts of the individual cumulative projects as they relate to the Project alternatives are evaluated and presented as well. A cumulative impact is identified as significant only if there are new significant impcts not previously discussed in the Project analysis.

3.6 REQUIRED PERMITS AND APPROVALS

There are numerous potentially applicable federal, state, regional, county, and city permits required for the construction, maintenance, and operation of the Santa Rosa Subregional Long-Term Wastewater Project. The *Permitting Report* (Harland Bartholomew & Associates, Inc. 1995) identifies permits and approvals to be obtained and the timing for permit acquisition. Those agencies which have direct permitting authority and will be expected to use this EIR/EIS in granting approval for the Project are:

FEDERAL AGENCY PERMITS AND APPROVALS

U.S. Army Corps of Engineers
U.S. Bureau of Land Management (BLM)

STATE AGENCY PERMITS AND APPROVALS

California Department of Transportation (Caltrans)
State Lands Commission
State Water Resources Control Board
California Department of Water Resources, Division of Safety of Dams (DSOD)
California Occupational Safety and Health Administration (CalOSHA)
California Coastal Commission
California Department of Fish and Game
State Office of Historic Preservation

REGIONAL AGENCY PERMITS AND APPROVALS

Bay Conservation and Development Commission (BCDC)
North Coast and San Francisco Bay Regional Water Quality Control Boards
Bay Area Air Quality Management District (BAAQMD)

COUNTY AND CITY AGENCY PERMITS AND APPROVALS

Sonoma County Permit and Resource Management Department
Sonoma County Public Works Department
Sonoma County Airport Land Use Commission
Marin County Public Works Department
City of Santa Rosa Public Works Department
City of Santa Rosa Fire Department

City of Cotati Public Works Department
City of Sebastopol Public Works Department
City of Sebastopol Building Department
City of Rohnert Park Public Works Department

A list of permits and approvals for which this EIR/EIS will be utilized is provided in Table 3.6-1. There are many other agencies that have review authority over the Project, EIR/EIS, or permits, but do not directly issue permits or approvals for the Project.

The review period will vary greatly depending upon the regulated activity, type of permit or review involved, and established procedures of the reviewing agency. The time required to complete the review and/or obtain a permit could range from one day to over one year. Agencies for which the review period could be six months or more are:

U.S. Army Corps of Engineers	Department of the Army Permit (Section 404)
U.S. Army Corps of Engineers	Department of the Army Permit (Section 10)
Advisory Council on Historic Preservation/State Office of Historic Preservation	Section 106 Review and Compliance
National Oceanic and Atmospheric Administration (NOAA) U.S. Fish and Wildlife Service/ National Marine Fisheries Service	Review Section 7 Consultation
California Coastal Commission	Coastal Development Permit, Coastal Zone Development Permit, Consistency Determination
State Lands Commission	Land Use Lease
State Water Resources Control Board	Water Rights Permit
State Water Resources Control Board	Petition for Change
California Department of Water Resources, Division of Safety of Dams (DSOD)	Approval of plans and specifications for the construction or enlargement of a dam or reservoir
California Department of Fish and Game	Section 2081 Management Agreement
Bay Area Air Quality Management District (BAAQMD)	Authority to Construct and Permit to Operate
North Coast and San Francisco Bay Regional Water Quality Control Boards	Point Source National Pollutant Discharge Elimination System (NPDES) Permit for discharge from a Publicly Owned Treatment Works (POTW)
North Coast and San Francisco Bay Regional Water Quality Control Boards	Waste Discharge Requirements
Sonoma County Permit and Resource Management Department	Subdivision or merger of parcels

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
Federal Agency Permits and Approvals					
U.S. Army Corps of Engineers	Department of the Army Permit (Section 404)	2, 3 (Must apply for an Individual Permit)	Discharge of dredged or fill material into waters of the U.S., (including wetlands).	Six to eight months after certification of the Final EIR/EIS	Section 404 Clean Water Act (33 USC 1344)
U.S. Army Corps of Engineers	Department of the Army Permit (Section 10)	2, 3, (Must apply for an Individual Permit)	Structures or work in or affecting navigable waters of the U.S.	Up to seven months after certification of Final EIR/EIS	Section 10 of Rivers and Harbors Act of 1899 (33 USC 403)
Advisory Council on Historic Preservation/State Office of Historic Preservation	Section 106 Review and Compliance	2, 3, 4, 5	Consideration of a Section 404/10 permit by the Corps.	Up to six months after certification of Final EIR/EIS.	National Historic Preservation Act 36 CFR 800
National Oceanic and Atmospheric Administration (NOAA)	Review	3, 5	Consideration of a Section 404/10 permit by the Corps (NOAA has other authority to prevent violation of the Marine Sanctuaries Act, but only permit-related review authority is listed here).		Clean Water Act; Marine Sanctuaries Act

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
U.S. Fish and Wildlife Service/ National Marine Fisheries Service	Section 7 Consultation	2, 3, 4, 5	Consideration of a Section 404/10 permit by the Corps.	Four to six months after certification of Final EIR/EIS	16 USCA 1531 et seq: 50 CFR Part 17, Sections 17.94-17.96 Endangered Species
U.S. Bureau of Land Management (BLM)	Geothermal Sundry Permit	4	Conversion of a geothermal well to an injection well.	One week	Geothermal Steam Act of 1970
U.S. Bureau of Land Management (BLM)	Geothermal Drilling Permit	4	Drilling a new geothermal well for use as an injection well.	One week	Geothermal Steam Act of 1970
U.S. Bureau of Land Management (BLM)	Right-of-Way	4	Crossing land owned or leased by BLM with a pipeline, road, or other facility.	Two weeks	Federal Land Policy and Management Act of 1976
U.S. Environmental Protection Agency (EPA)	UIC Group V Well Injection Permit	2, 3, 4	Injection of treated wastewater into wells. EPA generally defers to the Regional Water Quality Control Boards for enforcement of the Well Injection Permitting Program.	Refer to North Coast Regional Water Control Board Waste Discharge Requirements	Safe Drinking Water Act

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
State Agency Permits and Approvals					
California Department of Transportation (Caltrans)	Encroachment Permits	2, 3, 4	Use of State rights-of-way for installation of pipelines along state freeways and roads.	Two months after certification of Final EIR/EIS	21 CCR14.11.1-14.11.6
California Department of Transportation (Caltrans)	Transportation Permit	2, 3, 4	Transport of heavy or oversized loads on state roads during construction.	Same day as applied for	California Vehicle Code Section 35780; California Streets and Highway Code 117, 660-711
State Lands Commission	Land Use Lease	4	Placement of fill or structures in navigable waterways or Section 16 or 36 lands.	Six months	California Public Resources Code Section 6000 et. seq.
State Water Resources Control Board	Water Rights Permit	2, 3	Reservoirs without diversion structures for existing streamflow.	Six to twelve months	
State Water Resources Control Board	Petition for Change	2, 3, 4, 5	Change in location or amount of current wastewater discharge	One to twelve months	

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
California Department of Water Resources, Division of Safety of Dams (DSOD)	Approval of plans and specifications for the construction or enlargement of a dam or reservoir	2, 3	Dam or reservoir construction or enlargement.	Six months	California Water Code Division 3, Dams and Reservoirs Parts 1 and 2
California Occupational Safety and Health Administration (CalOSHA)	Permits for construction, trench excavations, and demolition	2, 3, 4, 5	Construction of trenches or excavations five feet or deeper and into which a person is required to descend. Construction or demolition of any building, structure, scaffolding or falsework more than three stories high. The underground use of diesel engines in working mines and tunnels.	One week	California Labor Code Section 6500
California Coastal Commission	Coastal Development Permit, Coastal Zone Development Permit, Consistency Determination	3	Any activity within the designated areas.	Three months after certification of Final EIR/EIS.	California Coastal Act; Coastal Zone Management Act
California Department of Fish and Game	Streambed Alteration Agreement	2, 3, 4, 5	Crossing of streams, rivers, or lakes (also for reservoirs which interrupt streams).	One month after certification of Final EIR/EIS.	Sections 1601-1603 of the California Fish and Game Code

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
California Department of Fish and Game	Section 2081 Management Agreement	2, 3, 4, 5	Potential adverse effects to state endangered or threatened species or species proposed for state listing. Incidental "take" of state protected species by a non-state entity.	Seven months after Final EIR/EIS certification	Section 2081 California Fish and Game Code
State Office of Historic Preservation	See Advisory Council on Historic Preservation under U.S. Army Corps of Engineers				

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
Regional Agency Permits and Approvals					
Bay Conservation and Development Commission (BCDC)	Development Permit, Consistency Determination	2	Any structures built in or near San Francisco Bay up to five feet above mean sea level.	Three months after Final EIR certification	San Francisco Bay Plan and McAteer Petris Act (California Government Code Sections 666000 et seq.); 14 CCR Division 5; Suisun Marsh Preservation Act of 1977 (Public Resources Code Section 2900 et seq.); Coastal Zone Management Act
North Coast and San Francisco Bay Regional Water Quality Control Boards	Point Source National Pollutant Discharge Elimination System (NPDES) Permit for discharge from a Publicly Owned Treatment Works (POTW)	All	Discharge of treated municipal wastewater from a publicly owned treatment works to waters of the U.S.	Six to seven months	Federal Clean Water Act; Porter-Cologne Water Quality Control Act

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
North Coast and San Francisco Bay Regional Water Quality Control Boards	General Construction Stormwater National Pollution Discharge Elimination System (NPDES) Permit	2, 3, 4, 5	All stormwater discharges when clearing, grading, and excavation result in a land disturbance of five or more acres.	Prior to construction	Clean Water Act
North Coast and San Francisco Bay Regional Water Quality Control Boards	Waste Discharge Requirements	2, 3, 4, 5	Discharge of reclaimed water on land and to groundwater.	Six months to one year	Porter-Cologne Water Quality Act
North Coast and San Francisco Bay Regional Water Quality Control Boards	Section 401 Water Quality Certification	2, 3, 4, 5	Discharge of fill materials to waters of the U.S.	Two months	Clean Water Act
Bay Area Air Quality Management District (BAAQMD)	Authority to Construct and Permit to Operate	2, 3, 4, 5	Any Project that emits criteria pollutants. Project also subject to reporting under Toxic Hot Spots legislation (AB 2588). District oversees criteria pollutant emissions and odor control.	One year or longer	New Source Review regulations; Clean Air Act; BAAQMD Regulation 2, Rule 2, Sections 301.2 and 302

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
County and City Agency Permits and Approvals					
Sonoma County Permit and Resource Management Department	Coastal Zone Development Permit	3	Any activity or structures built within the Coastal Zone designated by Local Coastal Plan (LCP).	Four months after certification of Final EIR/EIS	California Coastal Act; Coastal Zone Management Act
Sonoma County Permit and Resource Management Department	Subdivision or merger of parcels	2, 3, 4, 5	If City purchases property it may need to merge or subdivide parcels.	Two weeks to six months	County Codes
Sonoma County Permit and Resource Management Department	Use Permit	2, 3, 4, 5	Development of proposed facilities on leased land.	Three to four months	County Codes
Sonoma County Permit and Resource Management Department	Well Drilling Permit	2, 3, 4	Construction or destruction of all wells.	One to two weeks	County Codes
Sonoma County Permit and Resource Management Department	General Plan Consistency Review	2,3,4,5	Acquisition of land and easements for Project facilities.	Two to three months	California Government Code Sec. 65402

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
Sonoma County Permit and Resource Management Department	Cancellation of Williamson Act Contract	2,3	The non-renewal of any Williamson Act Contract.	Two to three months	California Lands Conservation Act (commonly known as Williamson Act)
Sonoma County Permit and Resource Management Department	Road Encroachment Permit	2, 3, 4, 5	New transmission, water, or gas line crossings, or construction on or across county roads.	One to two months	County Codes
Sonoma County Public Works Department	Grading Permit	2, 3, 4, 5	Certain grading activities if conducted prior to obtaining a building permit.	Two months	County Codes
Sonoma County Public Works Department	Transportation Permit	2, 3, 4, 5	Transport of heavy or oversized loads on county roads.	One day	County Codes
Sonoma County Airport Land Use Commission	Land Use Approval	2, 4, 5	Proposed land uses on airport property and in "referral area" around airports.	One month	County Codes
Marin County Public Works Department	Road Encroachment Permit	3	New transmission, water, or gas line crossings, or construction on or across county roads.	One to two months	County Codes

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
Marin County Public Works Department	Transportation Permit	3	Transport of heavy or oversized loads on county roads.	1 day	County Codes
City of Santa Rosa Public Works Department	Encroachment Permit	2, 3, 4, 5	Use of local jurisdictions right-of-way for installation of pipeline across roadways.	1 to 2 months	City ordinances
City of Santa Rosa Public Works Department	Transportation Permit	2, 3, 4, 5	Transport of heavy or oversized loads on city streets.	One day	City ordinances
City of Santa Rosa Public Works Department	Building Permit, Street Improvement Permit, Grading Permit	2, 3, 4, 5	Construction activities within the City of Santa Rosa.	Approximately one month after final design	Uniform Building Codes, as adopted
City of Santa Rosa Fire Department	Hazardous Materials Management Plan, Hazardous Materials Storage Permit, Hazardous Materials Inventory	2, 3, 4, 5	All facilities where hazardous materials are stored above or below ground in amounts greater than threshold quantities.	Approval on completion of construction phase	California Health and Safety Code Section 25580 et seq.
City of Cotati Public Works Department	Encroachment Permit	2	Use of local jurisdictions right-of-way for installation of pipeline along roadways.	One to two months	City Ordinances
City of Cotati Public Works Department	Transportation Permit	2	Transport of heavy or oversized loads on city streets.	One day	City Ordinances

Table 3.6-1

Potentially Applicable Federal, State, Regional, County, and City Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
City of Sebastopol Public Works Department	Encroachment Permit	3	Use of local jurisdictions right-of-way for installation of pipeline along roadways.	One to two months	City Ordinances
City of Sebastopol Public Works Department	Transportation Permit	3	Transport of heavy or oversized loads on city streets.	One day	City Ordinances
City of Sebastopol Building Department	Building Permit	3	Construction and installation of pipelines within city limits.	Two months	City Ordinances
City of Rohnert Park Public Works Department	Encroachment Permit	2, 3, 4	Use of local jurisdictions right-of-way for installation of pipeline along roadways.	One to two months	City Ordinances
City of Rohnert Park Public Works Department	Transportation Permit	2, 3, 4	Transport of heavy or oversized loads on city streets.	One day	City Ordinances

Source: Harland Bartholomew & Associates, Inc. 1995

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